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EQ8096 Universal Edge QAM

Software Version 6.6.0

REFERENCE GUIDE

2/1553-FGC 101 1019 Uen A

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Contents

Chapter 1: Introduction

Provides a description of the equipment, its main features and functions and identifies the controls, indicators and connectors.

Chapter 2: Installing the Equipment

Provides installation requirements, preparation and installation procedures, details external connectors and provides **important safety information.**

Chapter 3: Operating the EQ8096 Using the Web Browser

Details how to access and use the Web Browser Interface for a range of diagnostic and other utilities.

Chapter 4: Alarms

Details the Alarm web pages and what is contained on them.

Chapter 5: Configuration of Conditional Access Using XML File Download

Details of how to configure service/component scrambling (static conditional access event definition) when an external EIS 'Event Information System' is not available.

Chapter 6: Preventive Maintenance and Fault-Finding

Details routine maintenance tasks, servicing advice, fault-finding information, warranty, maintenance and gives relevant disposal information.

Chapter 7: Code Upgrade and License Key Entry

Specifies the procedure for upgrading software via FTP and obtaining and entering license keys to enable DVBCA functionality on the EQ8096.

Chapter 8: Unit Configuration via FTP

Details configuration storage to a local PC using the FTP **get** command and the configuration of other units with the same parameters using the FTP **put** command.

Chapter 9: Upgrading EQ8096 with Input and Output Option Cards

Details the procedures for installing and removing Input and Out Option Cards

Chapter 10: EQ8096 M-CMTS System Test Specification

Describes the system test specification for on site test and verification of the EQ8096 DEPI-MPT functionality using a CISCO uBR10K Core.

Annex A: Glossary

Annex B: Technical Specification

Introduction

This Reference Guide provides instructions and information for the installation, operation of the EQ8096 Universal Edge QAM.

This Reference Guide should be kept in a safe place for reference for the life of the equipment. It is not intended that this Reference Guide will be amended by the issue of individual pages. Any revision will be by a complete reissue. Further copies of this Reference Guide can be ordered from the address listed in *Customer Services*. If passing the equipment to a third party, also pass the relevant documentation.

Revision History

Issues of this Reference Guide are listed below:

Issue	Date	Software Version	Comments
1	Jan 2008	Sv 6.0.0	Initial Issue (New Re-Branded format).
2	Jan 2009	Sv 6.2.0	Covers extra functionality released in 6.2.0.
3	July 2009	Sv 6.5.0	Covers functionality released in 6.5.0.
A	Aug 2011	Sv 6.6.0	Allocation of Ericsson number. Identity & rebrand completion. Covers functionality released in 6.6.0.

Associated Documents

The following manuals/guides are also associated with this equipment:

Ericsson Document Identity	Original Document Number	Title
1/1553-FGC 101 1019 Uen A	ST.US.E10243	EQ8096 User Guide

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Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

Warning!

Warnings give information which, if strictly observed, will prevent personal injury or death, or damage to property or the environment. They are highlighted for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

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Return of Equipment

If you need to return equipment for repair please contact your local Ericsson Customer Services Department.
Please refer to the Customer Services Contact Information on Page vi

You will then be directed to return the faulty equipment to a repair centre with the appropriate facilities for that equipment. A tracking number will be issued that should be used if you need to enquire about the progress of the repair. The equipment should be properly packed and the tracking number should be clearly marked on the outside of the packaging.

Technical Publications

If you need to contact Ericsson Technical Publications regarding this publication, e-mail: tvtechpubs@ericsson.com.

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Introduction to the EQ8096

Chapter 1

Contents

1.1 Scope of this Reference Guide 1-3
1.1.1 Who Should Use This Reference Guide 1-3
1.1.2 Version Information 1-3
1.1.3 What Equipment is covered by This Reference Guide 1-3
1.1.4 Card Assignment 1-5
1.2 Summary of Features 1-5
1.2.1 Overview 1-5
1.2.2 Data Input 1-6
1.2.3 Transport Stream Processing 1-7
1.2.4 PSI Extraction and Insertion 1-7
1.2.5 DOCSIS 3.0 DTI Timestamping 1-7
1.2.6 Modulation and Up-conversion 1-8
1.2.7 Control and Monitoring 1-8
1.2.8 DVB-CA 1-8
1.3 Output Channel Mappings 1-8
1.3.1 Channel Mappings 1-8
1.3.1.1 Standard Mapping 1-9
1.3.1.2 Distributed Mapping 1-9
1.3.1.3 '6 Card' mapping 1-10
1.3.1.4 'Single 1G Input' mapping 1-10
1.3.2 UDP Port Mapping 1-10
1.4 Guided Tour 1-11
1.4.1 Enclosure 1-11
1.4.2 Front Panel Description 1-11
1.4.2.1 Front Panel LEDs 1-11
1.4.3 Front Panel Controls 1-12
1.4.4 Rear Panel Description 1-12

List of Figures

Figure 1.1 Slot Numbering (Rear View) 1-5
Figure 1.2 E8096 Front Panel Indicators. 1-12
Figure 1.3 EQ8096 Rear Panel Component Parts and Connectors 1-13

List of Tables

Table 1.1 Equipment Marketing Codes 1-4
Table 1.2 Card Assignment 1-5
Table 1.3 Input/Output mapping for ’Standard’ mode. 1-9
Table 1.4 Channel Allocations for ’Standard’ mode (example Slot 1). 1-9
Table 1.5 Channel Allocations for ‘Distributed Input’ mode (example Slot 1) 1-9
Table 1.6 Channel and Transport Stream Allocations for ‘Distributed Input’ mode (example Slot 1) 1-10
Table 1.7 Channel Allocations for ‘6 card’ mode (example Slot 1)..... 1-10
Table 1.8 Channel Allocations for ‘Single 1G Input’’ mode 1-10
Table 1.9 Front Panel Indicators 1-11

1.1 Scope of this Reference Guide

1.1.1 Who Should Use This Reference Guide

This Reference Guide is written for operators/users of the EQ8096 Universal Edge QAM to assist in the installation, operation and day-to-day care. This product is referred to throughout this Reference Guide as ‘EQ8096’.

Warning!

Removing the covers of this equipment may invalidate any warranties, cause a safety hazard or/and affect the EMC performance.

Caution!

Unauthorized maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

This Reference Guide does not include any maintenance information or procedures which would require the removal of covers.

1.1.2 Version Information

This Reference Guide has been written to cover **Software version 6.6.0** and later. The current versions can be found on the **Device Info** tabbed page by selecting the **Version Information web** page. The EQ8096 hardware provides a component based indication of the PCB version.

The appropriate number should be quoted in all correspondence with Ericsson.

1.1.3 What Equipment is covered by This Reference Guide

This Reference Guide covers the EQ8096 Universal Edge QAM, which is a digital cable product for use as a regional broadcast modulator.

The EQ8096 is configured to deliver up to 96QAM channels (for 6 MHz or 8 MHz QAM networks) using up to 8 modulator assemblies. The modulator assemblies should be ordered with each base unit.

Table 1.1 Equipment Marketing Codes

Marketing Code	Price Object Number	Supply Object Number	Description
EQ8096/BAS	FAZ 101 0127/1	KDU137662/1	Base Unit. Input card, single PSU, chassis, RJ-45 data input
EQ8096/HWO/12QAM	FAZ1010127/5	ROA 128 3919	12-channel QAM Modulator. One assembly provides up to 12-channels capable of frequencies up to 857 MHz
EQ8096/HWO/12QAM/UPG	FAZ1010127/13	ROA 128 4182	Modulator Assembly - 12QAM Channels upgrade
EQ8096/HWO/12QAM/1GHZ	FAZ1010127/6	ROA 128 3923	12-channel /QAM Modulator with extended RF range. One assembly provides up to 12-channels capable of frequencies up to 999 MHz
EQ8096/HWO/12QAM/1GHZ/ UPG	FAZ1010127/17	ROA 128 4186	12QAM 1GHz Option Card upgrade
EQ8096/HWO/DPS	FAZ1010127/7	ROA 128 3921	Dual PSUs
EQ8096/HWO/DPS/UPG	FAZ1010127/15	ROA 128 4184	Dual Power Supply upgrade
EQ8096/HWO/DPS/48V	FAZ1010127/8	ROA 128 3922	Dual PSU 48 V DC
EQ8096/HWO/DPS/48V/UPG	FAZ1010127/16	ROA 128 4185	Dual Power Supply for 48 V DC option upgrade
EQ8096/HWO/DTI	FAZ1010127/9	ROA 128 3920	DOCSIS Timing Interface. Client daughter card
EQ8096/HWO/DTI/UPG	FAZ1010127/14	ROA 128 4183	DOCSIS Timing Interface upgrade
EQ8096/BAS/SFP	FAZ 101 0127/3	KDU137662/2	Base unit, SFP. Base unit with SFP data connection interface
EQ8096/BAS/SFP/48V	FAZ 101 0127/4	KDU137662/4	Base Unit DC, SFP. I/P Card, Single PSU SFP, 48 V DC
EQ8096/BAS/48V	FAZ 101 0127/2	KDU137662/3	Base Unit DC. I/P Card, Simple PSU RJ-45, 48 V DC PSU
EQ8096/SWO/1GHZ	FAZ1010127/10	FAT1020297	License to extend 12QAM Modulator card to 1 GHz. License key enable option. Must be included at time of unit order if required.
EQ8096/SWO/DVBCA	FAZ1010127/11	FAT1020294	DVB Conditional Access and Scrambling. License key enabled option. Must be included at time of unit order if required.
EQ8096/SWO/MCMTS	FAZ1010127/12	FAT1020296	M-CMTS Base License

1.1.4 Card Assignment

Figure 1.1 shows the position of the various cards at the rear of the unit.

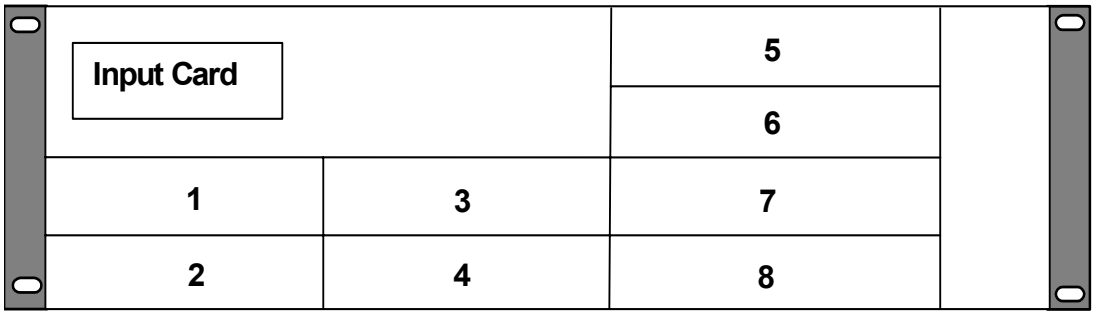

Figure 1.1 Slot Numbering (Rear View)

See *Table 1.2* for card position assignments.

Table 1.2 Card Assignment

Slot	Card	Comments
Input Card	Data Input and Control	This acts as the data input card and host controller, providing data and support for the Modulator assemblies.
1-8	MultiQAM assembly	EQ8096/HW0/12QAM - Modulator card assembly

1.2 Summary of Features

1.2.1 Overview

The EQ8096 is a key component for the cost-effective deployment of regional services over cable networks. Located at the network edge, the EQ8096 takes in single program Transport Streams and/or multi-program Transport Streams, DOCSIS 3.0 (MCMTS) DEPI data streams, provides remote multiplexing, QAM modulation and UHF up-conversion in a single highly integrated unit.

Its core features include:

- 8 x Electrical 1000BaseT or 8 x optical SFP option data input interface as standard configured in 1+1 redundancy mode.
- Support for reception, dejittering and remultiplexing of up to 4096 single program Transport Streams (SPTS) encapsulated in UDP (up to 64 services per output TS).
- Support for reception, dejittering and remultiplexing of up to 96 individual multi-program Transport Streams (MPTS) encapsulated in UDP (up to 64 services per MPTS).
- Support for generation of up to 96 multi-program Transport Streams (MPTS).

- Extraction of incoming PSI tables (PAT, PMT) and automatic PID remapping into outgoing multiple program Transport Streams.
- Automatic PAT and PMT generation into outgoing Transport Streams.
- Option to pass-through unfiltered a single input MPTS with a bit-rate up to 52 Mbps per output TS. This replaces all the SPTS inputs for that output.
- Support for service filtering, PID remapping when in MPTS mode.
- Support for multiplexing of up to 4 individual SPTS along with an input MPTS.
- Supports latest PSIG protocol for SI management.
- Hot-swap capability of Modulator cards.
- Control using web browser or SNMP via a separate redundant Ethernet control interface.
- Optional DVB-CA conditional access and scrambling.
- RPC protocol support for Switched Digital Video applications.
- Full DOCSIS 3.0 M-CMTS data support (including DEPI control plane, DEPI PSP and DEPI MPT modes).

1.2.2 Data Input

The EQ8096 supports four redundant data input interfaces, eight (4+4) 1000BaseT Gigabit Ethernet port (fitted as standard) or eight (4+4) SFP Mini-GBIC option slots. Full Gigabit line rate is supported. These input interfaces are described in detail in *Section 2.5.5, Active Data Port*. Each of these interfaces is designed to accept multiple-MPEG, single program Transport Streams (SPTS) or multi-program Transport Steams (MPTS) encapsulated as separate UDP data flows. The interfaces also support DOCSIS 3.0 DEPI encapsulated data. The EQ8096 imposes the following restrictions on the incoming data:

- All encapsulated transport packets must be 188 bytes long.
- UDP frames can contain from 1 to 7 transport packets.
- Incoming Transport Streams must be in the range from 1 kbps to 52 Mbps.
- Up to 4096 user-defined UDP port addresses each with an associated multicast address can be filtered simultaneously. The Transport Streams carried on these port addresses are dejittered and are therefore commonly associated with Transport Streams containing video and/or audio content.
- The user defines the input multicast address and UDP port number to be used for each program in the output transport stream.
- For M-CMTS, the user defines SessionIDs according to the DOCSIS 3.0 DEPI specification. The format of data must be as per this specification and the EQ8096 supports DEPI encapsulation within UDP or without UDP.

- The RF channel that each TS is multiplexed to is defined in *Table 1.3.*
- The EQ8096 can optionally be controlled via an ERM/SDV server using RPC control protocol.

1.2.3 Transport Stream Processing

The EQ8096 is designed to automatically detect incoming Transport Streams and remultiplex them into new multi-program Transport Streams.

- Each service has its PCR recovered and re-stamped after Multiplexing into the output MPTS (QAM). The subsequent absolute bit rate of the output stream will be within +/- 30 ppm of the originating stream. The rate of change of bit rate of each multiplexed service is within the MPEG-2 system specification.

1.2.4 PSI Extraction and Insertion

The unit carries out automatic PSI extraction (PAT and PMTs referenced in the PAT) from each of the incoming TS flows. While the unit remains locked to the incoming flow it periodically monitors the incoming transport stream for changes in the PAT or PMT.

The PIDs extracted from these tables are used to configure the PID filters for each of the flows. Each PID filter supports the filtering and remapping of up to 16 elementary streams. These are extracted sequentially from the PMT. A single SPTS will occupy 1 PID filter. For MPTS, single services within occupy 1 PID filter, thus allowing any MPEG service to convey up to 16 elementary streams. The EQ8096 does not support extraction of tables other than the PAT and PMT.

For each generated multiplexed transport stream, the EQ8096 generates a PAT and series of PMTs that reflect the make up of the transport stream. Any descriptors extracted from the incoming flow are transferred to the appropriate PMT.

The user can define the PID ranges to be used for the PMTs, elementary streams and ECMs.

1.2.5 DOCSIS 3.0 DTI Timestamping

When a channel is being operated as a DEPI data device, the unit will automatically adjust or insert time stamps based on the current unit running Time stamp. The optional DTI client card translates DTI time stamps from the DTI server and provides DTI lock to the EQ8096 unit. This frequency lock is used to stamp or insert (depending on DEPI PSP or MPT mode) DEPI SYNC packets as they transit through the box.

1.2.6 Modulation and Up-conversion

Each modulator card of the EQ8096 supports the simultaneous generation of up to 12QAM channels via 3 F-type connectors. Each channel shares the same annex, QAM mode and symbol-rate. Each output connector provides up to four adjacent QAM channels.

For redundancy, each Modulator assembly supports hot swap. This feature is detailed in *Section 6.5.4, Preventive Maintenance and Fault-finding*

1.2.7 Control and Monitoring

The EQ8096 supports a dedicated dual redundant Ethernet control port for the control and monitoring of the unit. It can be controlled using either the built-in Web server, which can be accessed via a standard web browser application, or via SNMP. The Web interface allows the user full control of the unit's configuration and can also be used to obtain the current status of the unit.

The SNMP interface has support for alarm generation via SNMP traps. These traps are configured via the Web interface. All user-controlled parameters are stored in non-volatile memory and are restored on power up.

1.2.8 DVB-CA

This is an optional feature that can selectively scramble services of one or more MPEG Transport Streams, controlled by an external third-party DVB-CA (Simulcrypt compliant) system or using a stand-alone XML configuration file.

Communications to the CA system (EIS, ECMG and EMMG communication) are via a dedicated dual redundant CA port.

1.3 Output Channel Mappings

1.3.1 Channel Mappings

The EQ8096 supports 96 total QAM channels, spread across a maximum of 8 Output cards. Each Output card supports a maximum of 12-channels.

The EQ8096 can operate in 4 distinct mapping modes, depending on the installation requirements:

- Standard (direct) mapping
- Distributed (striped) mapping
- '6 Card' mapping
- Single 1G Input mapping

1.3.1.1 Standard Mapping

When configured in Standard mapping mode (default), there is a direct relationship between Input Data ports and Output cards which can be seen in *Table 1.3*.

Table 1.3 Input/Output mapping for 'Standard' mode.

Data Port	Output Card Slot	Transport Streams
P1/S1	1, 2	1-24
P2/S2	3, 4	25-48
P3/S3	5, 6	49-72
P4/S4	7, 8	73-96

The Transport Streams are mapped logically as defined in *Table 1.4*. Channel designations defined in the tables are as seen from the rear of the unit.

Table 1.4 Channel Allocations for 'Standard' mode (example Slot 1).

	Output											
	1 Left-most connector				2				3 Right-most connector			
Channel	1	2	3	4	1	2	3	4	1	2	3	4
Transport Stream	TS 1	TS 2	TS 3	TS 4	TS 5	TS 6	TS 7	TS 8	TS 9	TS 10	TS 11	TS 12

1.3.1.2 Distributed Mapping

Distributed mapping mode can be configured when installed within an RF redundant network. This is often referred to as 'QAM Striping'.

The Data port (1-4) is directly mapped to the channel (1-4) on each spigot. Each data port covers all 8 Output cards therefore and the Transport Stream increments across RF connectors/spigots (1-24).

Table 1.5 Channel Allocations for 'Distributed Input' mode (example Slot 1)

Data Port	Spigot Channel	Output Card Slot Transport Streams
P1/S1	1	1-24
P2/S2	2	25-48
P3/S3	3	49-72
P4/S4	4	73-96

Table 1.6 Channel and Transport Stream Allocations for 'Distributed Input' mode (example Slot 1)

	Output											
	1 Left-most connector				**2**				**3 Right-most connector**			
Channel	1	2	3	4	1	2	3	4	1	2	3	4
Transport Stream	TS 1	TS 25	TS 49	TS 73	TS 2	TS 26	TS 50	TS 74	TS 3	TS 27	TS 51	TS 75

1.3.1.3 '6 Card' mapping

Operating in '6 Card mode' configures the EQ8096 into data-efficient Input/Output mapping for use when 4 x Annex A (8 MHz) channels are being used per spigot. When in this configuration, maximum bandwidth can be achieved using only 6 installed Output cards (72QAMs).

Table 1.7 Channel Allocations for '6 card' mode (example Slot 1)

Data Port	**Spigot Channel**	**Transport Streams**
P1/S1	1, 2	1-18
P2/S2	2, 3	19-36
P3/S3	4, 5	37-54
P4/S4	5, 6	55-72

1.3.1.4 'Single 1G Input' mapping

Operating in 'Single 1G Input' mode configures the EQ8096 to spread a single 1G Input across the first 2 QAMs on each connector, on a total of 6 installed Output cards (36QAMs).

Note: You must also enable '6 card' mode to operate in this fashion.

Table 1.8 Channel Allocations for 'Single 1G Input'' mode

Data Port	**Output Card Slot**	**Transport Streams**
P1/S1	1, 2, 3, 4, 5, 6	1-36

1.3.2 UDP Port Mapping

Each QAM channel supports up to 32 services (64 in extended mode), each supporting up to 16 elementary streams (1 PAT, 1 PMT, 14 ES). Each service in an output transport stream can have its program number fixed, configurable or unmodified.

1.4 Guided Tour

1.4.1 Enclosure

The enclosure is 2U and is used as a stand-alone unit. All inputs and outputs are via rear panel connectors, with the exception of the LCD and button input at the front of the unit (for setting IP address).

1.4.2 Front Panel Description

The Front panel of the EQ8096 is fitted with a single power supply unit (PSU1) as standard and may be optionally fitted with a second power supply (PSU2) to provide 1+1 redundancy. When two power supplies are fitted, they operate in load sharing mode. Both are secured by clips and, if required, may be removed from the front of the unit. On the left hand side of the panel is a 2-line LCD display which may be used for local control configuration *(*see *Chapter 2, Installing the Equipment* for details*).*

1.4.2.1 Front Panel LEDs

There are 7 LED indicators, 3 located on the left of the front panel and 4 located across both power supplies, when fitted (see *Figure 1.2 and Table 1.9)*.

Table 1.9 Front Panel Indicators

Indicator	Color	Description
Alarm	Red	This LED is lit when an alarm condition has been detected.
Power	Green	This LED is lit when power is being received.
Active (DTI lock)	Blue	This LED is lit when the DTI client card is locked to the DTI server (M-CMTS only).
PSU Power x 2	Green	This LED is lit when the power supply is in use
PSU Fault x 2	Amber	This LED is lit when a fault condition is detected in the power supply

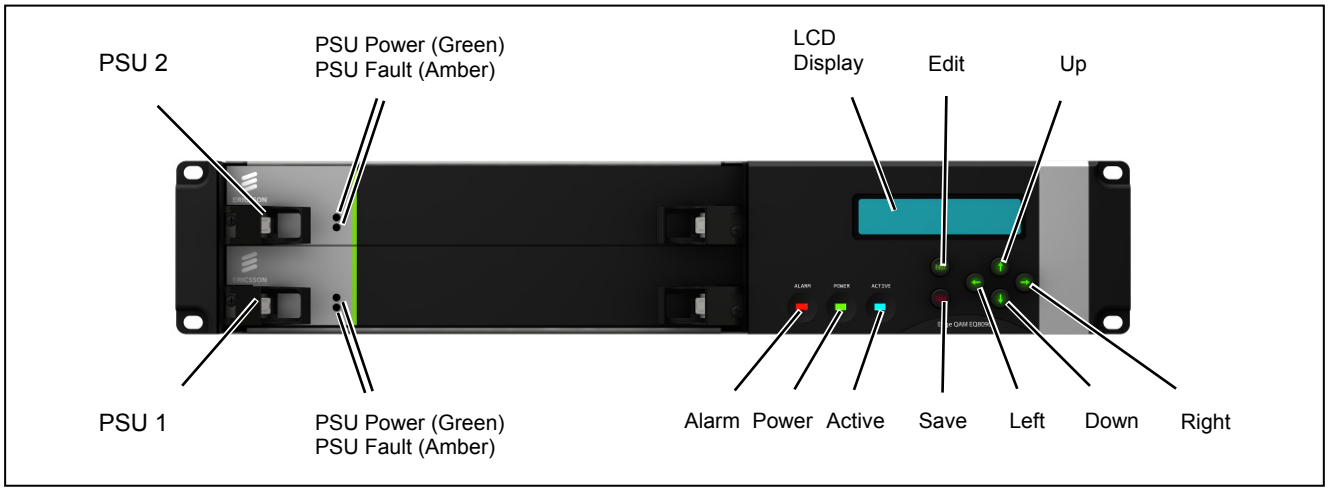

Figure 1.2 E8096 Front Panel Indicators.

1.4.3 Front Panel Controls

The physical interface for the Front Panel consists of an alphanumeric LCD display, pushbuttons, and status LEDs that are used to set-up and monitor the unit. The general layout is shown in *Figure 1.2*.

User input is via six pushbuttons comprising four cursor pushbuttons: **Left**, **Right**, **Up**, and **Down**; and two edit control pushbuttons: **Edit** and **Save**.

Each pushbutton has an integral green LED except **Save**, which has an integral red LED. The LEDs remain lit until a pushbutton is depressed. **Edit** will flash when depressed, until either depressed a second time or **Save** is depressed. Information on the use of these controls is given in *Chapter 2, Installing the Equipment.*

1.4.4 Rear Panel Description

The EQ8096 provides connectors at the rear panel. The rear panel comprises of a connector panel and eight modulator units each fitted with three RF outputs and three status indicators. A fully populated modulator unit is shown in *Figure 1.3.* On the right side of the unit are two mains input connectors, one for each of the two PSUs fitted in this unit.

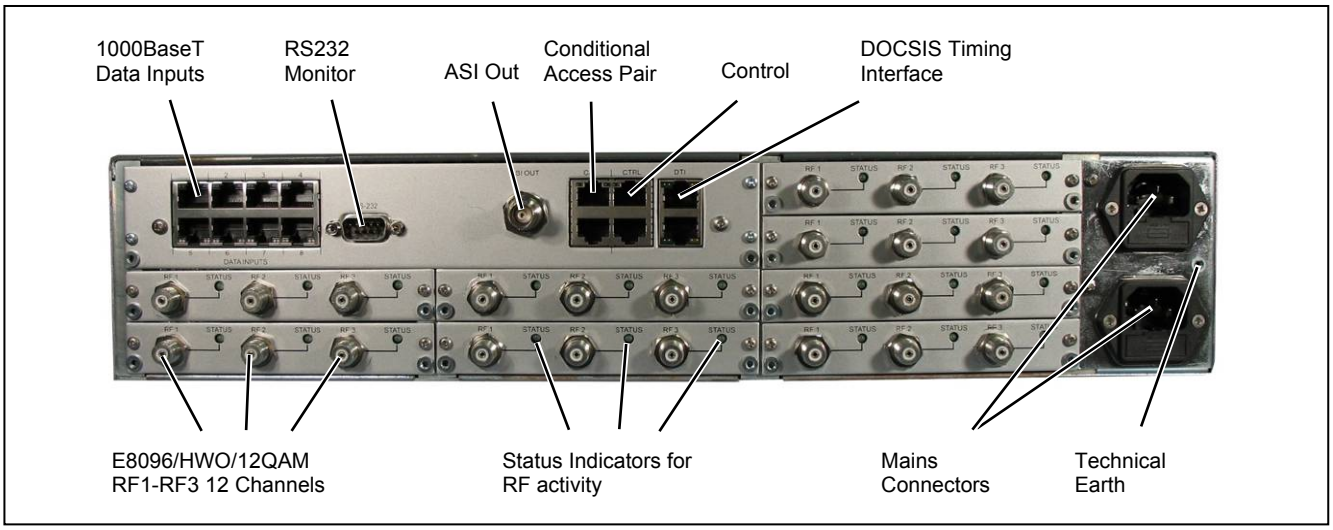

Figure 1.3 EQ8096 Rear Panel Component Parts and Connectors

See *Chapter 2, Installing the Equipment* for details of the rear panel connectors and indicators.

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Installing the Equipment

Chapter 2

Contents

2.1	Introduction	2-3
2.1.1	Read This First!	2-3
2.1.2	General	2-3
2.1.3	Site Requirements	2-3
2.1.3.1	Power Supplies	2-3
2.1.3.2	Environment	2-3
2.1.4	EMC Compliance Statements	2-3
2.1.4.1	EN 55022	2-3
2.1.4.2	FCC	2-3
2.2	Preliminary Checks	2-4
2.2.1	Mechanical Inspection	2-4
2.2.2	Moving the Equipment Safely	2-4
2.3	Installing the Equipment	2-4
2.3.1	Fixing Method	2-4
2.3.2	Cable Routing	2-5
2.3.3	Equipment Access	2-5
2.3.4	Ventilation	2-5
2.4	AC Mains Operating Voltage and Earthing	2-6
2.4.1	AC Power Supply	2-6
2.4.2	Power Cable and Earthing	2-6
2.4.2.1	General	2-6
2.4.3	Technical Earth	2-7
2.4.3.1	Connecting the Unit to an AC Power Supply	2-9
2.5	-48 V DC Power Supply	2-9
2.5.1	DC Power Supply	2-9
2.5.2	Location of the DC Input Connector	2-10
2.5.3	DC Connector Details	2-11
2.5.4	Connection cable color coding	2-11
2.5.5	Connecting the Unit to a DC Power Supply	2-11
2.5.6	Technical Earth	2-12
2.6	Signal Connections	2-12
2.6.1	Introduction	2-12
2.6.2	Connecting the Unit	2-13
2.6.3	Active Data Port	2-13
2.6.3.1	Introduction	2-13
2.6.3.2	SFP Mini-GBIC Modules (Optional)	2-13
2.6.3.3	1000BaseT Data Connectors	2-13

2.6.4 Control 2-14
2.6.5 CA Control Port Options 2-14
2.6.6 DOCSIS Timing Interface (DTI) 2-14
2.6.7 ASI Monitor port 2-14
2.6.8 Host Status 2-14
2.6.9 RF Output Ports 2-15
2.7 Indicators 2-15
2.7.1 Front Panel 2-15
2.7.2 Rear Panel 2-16

List of Figures

Figure 2.1 Air Path through the Enclosure 2-6
Figure 2.2 Location of the Technical Earth 2-8
Figure 2.3 Connector Block for -48 V DC Input 2-10
Figure 2.4 Connector Block for -48 V DC Input (Without Fuse) 2-11
Figure 2.5 EQ8096 Rear Panel Component Parts and Connectors 2-12

List of Tables

Table 2.1 Supply Cable Wiring Colors 2-7
Table 2.2 Non Standard Supply Cord Wire Colors 2-7
Table 2.3 DC Connector Wire Colors 2-11
Table 2.4 Host Status Connector Pin-outs 2-15
Table 2.5 RF Input Connector 2-15
Table 2.6 Front Panel LCD Display 2-16
Table 2.7 Modifying the IP or Mask Locally 2-16

2.1 Introduction

2.1.1 Read This First!

The EQ8096 must be handled carefully and thoughtfully to prevent safety hazards and damage. Ensure the personnel designated to install the unit have the appropriate skills and knowledge. If in any doubt, contact Ericsson Customer Services.

Follow the instructions for installation and only use installation accessories recommended by the manufacturers.

Note: Please refer to the *User Guide* for standard installation procedures.

2.1.2 General

Ericsson personnel normally perform installation of the EQ8096. This chapter provides configuration and connection information for planning installations, checking the final set up in the event of a fault, modifying the requirements or moving the equipment to another location. In the event of problems, contact Customer Services.

2.1.3 Site Requirements

2.1.3.1 Power Supplies

See *Annex B, Technical Specification* for a full specification.

2.1.3.2 Environment

See *Annex B, Technical Specification* for a full specification.

Do not install this product in areas of high humidity or where there is danger of water ingress.

2.1.4 EMC Compliance Statements[1]

2.1.4.1 EN 55022

This equipment is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

2.1.4.2 FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

[1] The EMC information was correct at the time of manufacture. The EMC tests were performed with the Technical earth attached.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.2 Preliminary Checks

2.2.1 Mechanical Inspection

When taking delivery of an EQ8096, check the equipment items delivered against the enclosed delivery note. Inspect the equipment for damage in transit. If in doubt, contact Customer Services (see *Preliminary Pages*).

Note: Do not remove the covers of this equipment as doing so may invalidate any warranties, cause a safety hazard and/or affect the EMC performance. It may also invalidate any safety tests. Check with Customer Services beforehand.

2.2.2 Moving the Equipment Safely

Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury and serious damage to the product. Use only with a cart, stand, bracket or table recommended by Ericsson.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

Do not move or carry the equipment whilst it is still connected to the supply or other leads, is live or is in operation.

2.3 Installing the Equipment

2.3.1 Fixing Method

The EQ8096 can be operated mounted in a 19-inch rack. Ensure that it is firmly and safely located and has an adequate through-flow of air.

Slide the unit onto the chassis supports and affix to the rack by means of an M6 x 18 mm panhead screw in each corner.

Do not use this product as a support for any other equipment.

2.3.2 Cable Routing

Power supply cables should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cables at plugs, convenience receptacles, and the point where they exit from the appliance.

Do not run AC power cables in the same duct as signal leads.

2.3.3 Equipment Access

Ensure that the EQ8096 is installed in such a way as to allow access to the rear of the unit and the connectors.

2.3.4 Ventilation

Warning!

Never push objects of any kind into this equipment through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

Cautions!

Openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a rack unless proper ventilation is provided or the instructions have been adhered to.

Do not install equipment so that the air intake of one aligns with the outlet on another. Provide baffles and adequate spacing.

The fans contained within this unit are not fitted with a dust/insect filter. Pay particular attention to the environment in which it is to be used.

The unit is designed for stationary or fixed use only. Ensure it is firmly and safely located and has an adequate through-flow of air. Allow at least 50 mm free air-space at each side of the equipment. Units can be stacked up to 4 separated by a 1RU baffle. Racks containing stacked equipment may need to be forced-air cooled to reduce the operating ambient temperature. For stacking constraints contact Ericsson Customer Services.

Figure 2.1 Air Path through the Enclosure

2.4 AC Mains Operating Voltage and Earthing

2.4.1 AC Power Supply

Caution!

This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your business, consult a qualified electrical engineer or your local power company.

See *Annex B, Technical Specification* for a full power supply specification. There are no links or switches to be altered for operation from different AC supplies.

2.4.2 Power Cable and Earthing

2.4.2.1 General

Check that the AC power cable is suitable for the country in which the unit is to be used.

Warnings!

If the molded plug fitted to the mains cable supplied with this unit is not required, please dispose of it safely. Failure to do this may endanger life as live ends may be exposed if the removed plug is inserted into a mains outlet.

Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

The unit is supplied with a detachable mains-supply cable fitted with a molded plug suitable for the USA, UK or Europe as appropriate.

The wires in the mains-supply cable are colored in accordance with the wire color code shown in *Table 2.1*.

Table 2.1 Supply Cable Wiring Colors

	UK (BS 1363)	**EUROPE (CEE 7/7)**	**USA (NEMA 5-15P)**
Earth:	Green-and-yellow	Green-and-yellow	Green
Neutral:	Blue	Blue	White
Live:	Brown	Brown	Black

If the colors do not correspond with the colored markings identifying the terminals in a locally supplied plug, proceed as in *Table 2.2* (included for reference).

Table 2.2 Non Standard Supply Cord Wire Colors

Wire Color (UK)	**Action**
green-and-yellow	...must be connected to the terminal in the plug which is marked with the letter E or the safety earth symbol ⏚ or colored green or green-and-yellow.
blue	...must be connected to the terminal in the plug which is marked with the letter N or colored black.
brown	...must be connected to the terminal in the plug which is marked with the letter L or colored red.

2.4.3 Technical Earth

Connect the EQ8096's Technical Earth to a suitable point.

Warnings!

This unit must be correctly earthed through the molded plug supplied; if the local mains supply does not have an earth conductor do not connect the unit. Contact Customer Services for advice.

Before connecting the unit to the supply, check the supply requirements in *Annex B, Technical Specification*.

The unit has a Technical Earth terminal (marked with ⏚) located adjacent to the rear-panel mains inputs. Its use is recommended. This is **NOT** a Protective earth for electric shock protection. The terminal is provided to:

- Ensure all equipment chassis fixed within a rack are at the same Technical Earth potential. To do this, connect a wire between the Technical earth terminal and a suitable point on the rack.
- Eliminate the migration of stray charges when connecting between equipment.

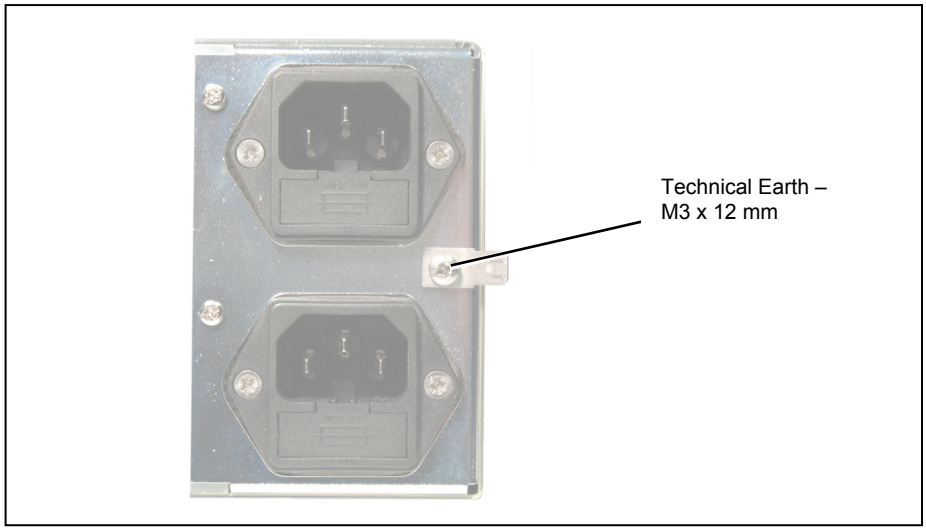


Figure 2.2 Location of the Technical Earth

Warning!

If the terminal screw has to be replaced, use the following:

M3 x 12 mm long Pozidrive Panhead.

Using a longer screw may cause a safety hazard.

2.4.3.1 Connecting the Unit to an AC Power Supply

Warnings!

Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.

As no mains switch is fitted to this unit, ensure the local AC power supply is switched OFF before connecting the supply cord.

The unit is not fitted with an ON/OFF switch. Ensure that the socket outlet is installed near the equipment so that it is easily accessible. Failure to isolate the equipment properly may cause a safety hazard.

The EQ8096 can be fitted with dual power supplies each with a separate mains connector. The equipment load is automatically split between the two power supplies (if option fitted). If one power supply fails, the full load will be transferred to the remaining serviceable unit allowing the faulty unit to be replaced without switching off the equipment. To connect the unit to the local AC power supply:

1. Ensure the local AC supply is switched OFF.
2. Ensure the correct fuse type and rating has been fitted to both the equipment and the AC power cables.
3. Connect the AC power leads to the EQ8096 mains input connector and then to the local mains supply.

2.5 -48 V DC Power Supply

2.5.1 DC Power Supply

Note: Only models EQ8096/BAS/48V, EQ8096/BAS/SFP/48V and EQ8096/HWO/DPS/48V use a DC power supply.

Cautions!

This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your business, consult a qualified electrical engineer.

This equipment is Class 1 and must have a protective earth.

This product uses a –48 V DC power supply source (see *Annex B, Technical Specification)* for a full power supply specification.

This equipment may be fitted with either a connector that has an **integral fuse with wiring terminals** (see *Figure 2.3*) **or a dedicated 3-pin connector without a fuse** (see *Figure 2.4*). For both types of connector, for protection of the DC wiring, a circuit breaker of maximum 16 A is recommended.

For wiring DC power, a minimum wire size of 1.0 mm^2 (17AWG) is recommended. This may need to be increased for longer cable runs.

2.5.2 Location of the DC Input Connector

The connector is located at the right-hand rear of the equipment.

Warning!

The –48 V DC EQ8096 is not fitted with an ON/OFF switch. Ensure that the supply has a suitable means of isolation that is easily accessible. Failure to isolate the equipment properly may cause a safety hazard.

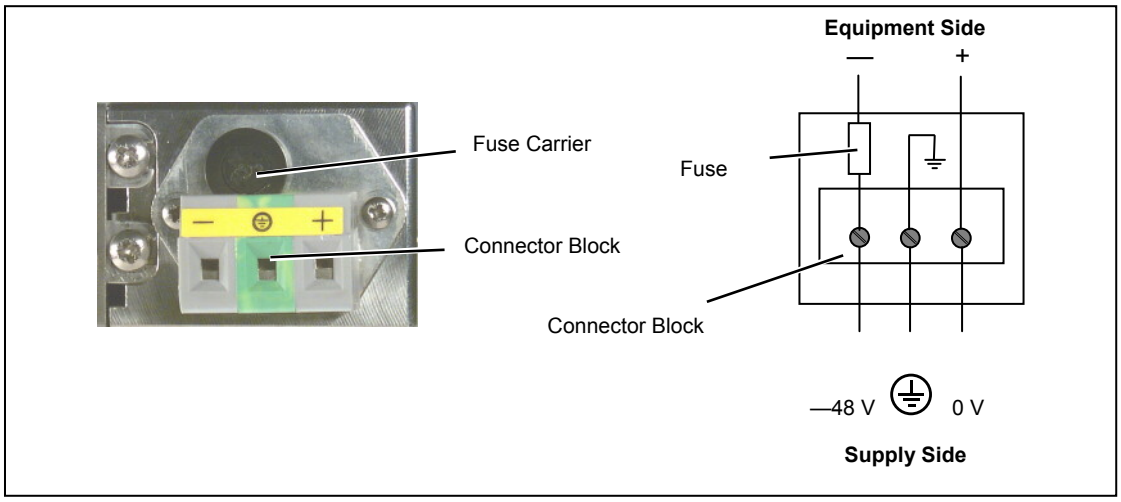


Figure 2.3 Connector Block for -48 V DC Input

In the connector, shown above, the equipment fuse is held in an integral fuse carrier at the DC power inlet at the rear of the EQ8096. See *Annex B, Technical Specification* for DC fuse information.

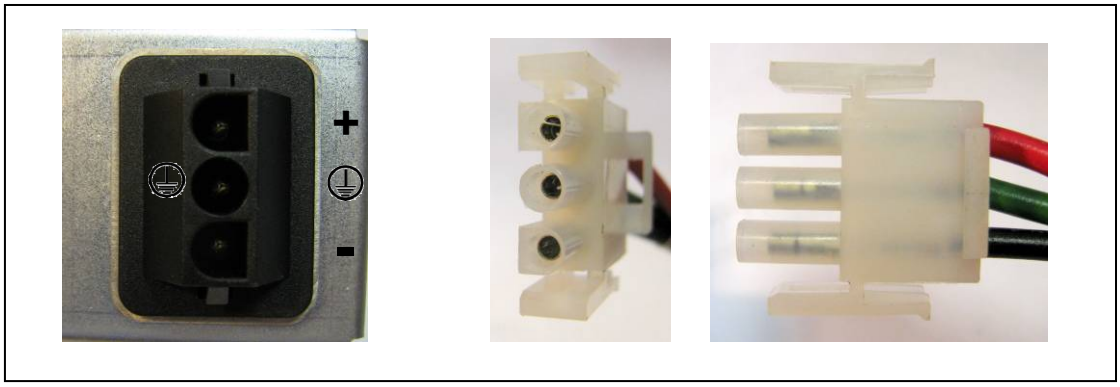


Figure 2.4 Connector Block for -48 V DC Input (Without Fuse)

2.5.3 DC Connector Details

For connection to the –48 V input connector (shown in *Figure 2.4*) the following parts from AMP or Molex should be used:

AMP Universal MATE-N-LOK
Housing: AMP no. 1-480700-0
Female terminal (3 needed per housing): AMP no. 926901-1

Molex MLX
Housing: Molex no. 50-84-1030
Female terminal (3 needed per housing): Molex no. 02-08-1002

2.5.4 Connection cable color coding

The DC input cable supplied with the product is color coded in accordance with the following.

Table 2.3 DC Connector Wire Colors

Earth	**Green-and-yellow**
–48 V	Blue
0 V	Brown

2.5.5 Connecting the Unit to a DC Power Supply

Note: This equipment is not intended for direct connection to centralized DC power systems in the USA or Canada.

Connect the EQ8096 to the local DC power supply as follows.

1. **Local DC Power Supply** - Ensure the local DC supply is isolated.
2. **EQ8096** - Ensure circuit protection of a suitable value is fitted to the product supply wiring.
3. **Supply Cord** - Connect the DC lead to the EQ8096 input connector and then to the local DC power supply. Switch on the DC power supply.

2.5.6 Technical Earth

The unit has a Technical earth terminal (marked with ⏚) located at the rear panel (see *Figure 2.5*). Its use is recommended. This is **NOT** a Protective earth for electric shock protection. The terminal is provided to:

- Ensure all equipment chassis fixed within a rack are at the same Technical earth potential. To do this, connect a wire between the Technical earth terminal and a suitable point on the rack.
- Eliminate the migration of stray charges when connecting between equipment.

Warning!

If the terminal screw has to be replaced, use the following:

M3 x 12 mm long Pozidrive Panhead.

Using a longer screw may cause a safety hazard.

2.6 Signal Connections

2.6.1 Introduction

All signal connectors are located at the rear panel of the unit. For a detailed interface specification see *Annex B, Technical Specification*.

Always use the specified cables supplied for signal integrity and compliance with EMC requirements (see *Annex B, Technical Specification*).

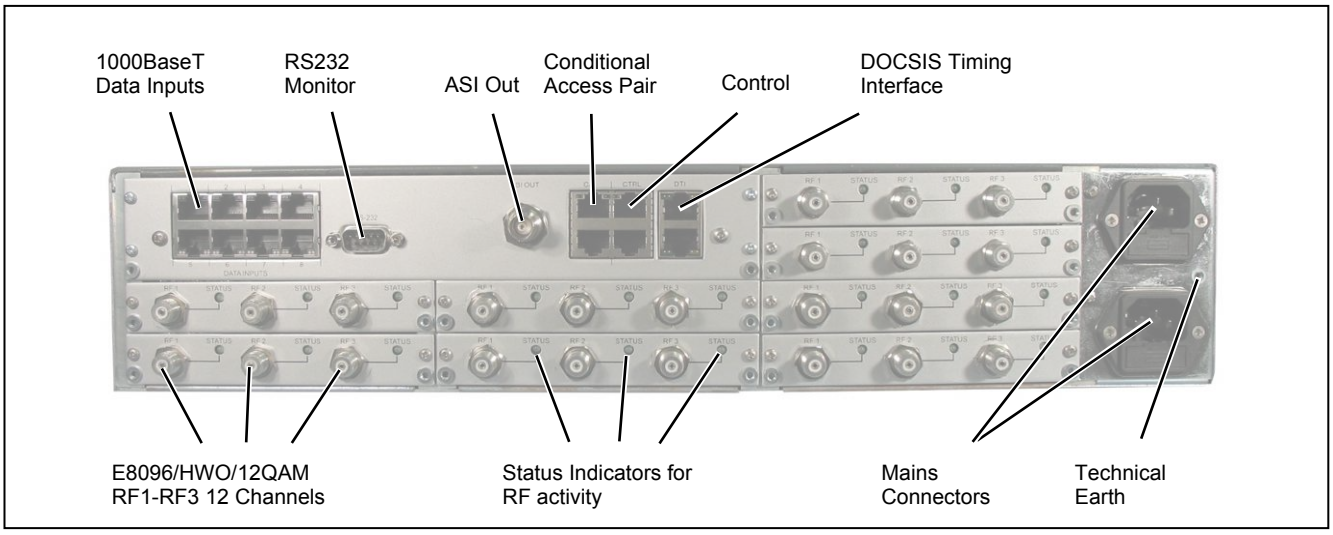


Figure 2.5 EQ8096 Rear Panel Component Parts and Connectors

2.6.2 Connecting the Unit

Once the unit has been installed in its intended operating position, it is ready to be connected to the rest of the system equipment providing it too has been installed.

Do not move or install equipment whilst it is still attached to the mains supply. Ensure ESD precautions are observed whilst interconnecting equipment.

2.6.3 Active Data Port

2.6.3.1 Introduction

The EQ8096 supports four redundant data input interfaces. As standard, the EQ8096 offers electrical (RJ-45) copper ports. These are active as 4 independent pairs (8 physical connections).

The 1000BaseT connections are auto-speed sensing. There are two LED's carried by the connector. The green LED indicates the channel status (Link level connection active) and the amber LED indicates channel activity.

Each data port is assigned its own unique IP address and subnet mask. These are given factory default values at the point of manufacture. The IP address is modifiable by the operator (see the User Guide for details).

2.6.3.2 SFP Mini-GBIC Modules (Optional)

Warning!

Class I Led Product when fitted with a fiber optic adapter. Do not look into the aperture. Looking into the aperture could cause discomfort to your eye.

The EQ8096 supports four pairs of Small Form-factor Pluggable (SFP) Gigabit Interface Converter (GBIC) slots. These take the form of a cage in the unit into which an SFP pluggable module (not supplied) can be fitted.

When the SFP GBIC bi directional ports are enabled, the application monitors the line status and presence of each of the modules. If the primary GBIC port is active then this is used for data reception. If any of the primary ports are inactive for more than one second, and the secondary module is active, then the application switches to using the secondary port. If the application is using the secondary port and the primary port becomes active for more than five seconds then the application switches back to using the primary port for data reception.

Note: A port being active is defined as having a valid line connection rather than receiving valid data.

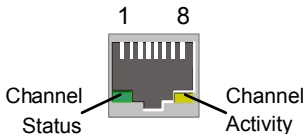
2.6.3.3 1000BaseT Data Connectors

The gigabit Ethernet connections are RJ-45 connectors and are auto-speed sensing between 10, 100 and 1000 Mbps.

There are two LEDs carried by each connector. The green LED indicates the channel status and the amber LED indicates channel activity.

2.6.4 Control

The EQ8096 supports two redundant Ethernet 10/100BaseT control ports via two RJ-45 connectors mounted on the rear panel *(*see *Figure 2.5* for details). The ports are auto-speed sensing between 10 and 100 Mbps and support both full and half-duplex modes of operation.



There are two LEDs carried by each connector. The green LED indicates the channel status and the amber LED indicates channel activity.

The control ports are assigned their own unique IP address and subnet mask which are given invalid default values at the point of manufacture. The IP address is modifiable by the operator (see the User Guide for details). A default gateway address can also be set for this port.

2.6.5 CA Control Port Options

The EQ8096 supports two redundant Ethernet 10/100BaseT control ports via two RJ-45 connectors mounted on the rear panel. The redundant CA control connection Pair operates in the same way as the Control pair outlined above.

2.6.6 DOCSIS Timing Interface (DTI)

The EQ8096 supports two redundant DOCSIS Timing Interface (DTI) ports via two RJ-45 connectors mounted on the rear panel. The redundant DTI connection pair operates as the published DOCSIS 3.0 DTI specification.

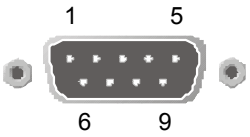
2.6.7 ASI Monitor port

BNC provides GUI controlled output TS for monitoring purposes. Appropriate output TS appears at this output when selected within the EQ8096 User Interface.

Note: Data is **pre-encryption**.

2.6.8 Host Status

The EQ8096 supports an additional serial RS-232 port. This is primarily intended for use by ERICSSON service personnel.



This has the pin assignments shown in *Table 2.4*. See *Chapter 3* for further details.

Table 2.4 Host Status Connector Pin-outs

Pin	Description
Pin 2	RS-232 - RxD
Pin 3	RS-232 - TxD
Pin 5	RS-232- Ground
Pin 7	RTS (Active)
Pins 1,4,6,8,9	Not connected.

2.6.9 RF Output Ports

The EQ8096 supports up to 24 RF output ports using F-type connectors. Each output port supports up to 4 adjacent RF channels.

The RF output provides a user configurable parameter to control the output.

Table 2.5 RF Input Connector

Input		Specification
Connector type		F-type, Female
Connector designation		RF n
Pin-outs:	Centre Shield	RF Output Ground/Chassis
Impedance		75 Ω

Caution!

The F-connector is not intended for continuous connections and disconnections. Use a sacrificial connector if the EQ8096 is intended to be used in this way.

2.7 Indicators

2.7.1 Front Panel

The front panel carries a power-on LED (Green), an Alarm LED (Red) and an Active Unit (DTI Lock) LED (Blue) (described in *Chapter 4, Alarms*). There is also a front panel LCD screen. The possible displays are detailed in *Table 2.5.*

Table 2.6 Front Panel LCD Display

Screen	Display	Explanation
Initial Bootloader Screen	_Running: ppc1.elf	Presented when unit it first powered up. Displays version of bootloader being run.
Application Load Screen	Boot FLASH A V1.8 Ppc1.elf / niosl.elf	Presented after boot-up, when the main application is running.
Normal Operating Screen	IP 172.017.125.112 Mask 255.255.000.000	Shows the IP and mask for the main control Ethernet Port.

The IP or Mask may be modified locally by carrying out the actions detailed in *Table 2.7.*

Table 2.7 Modifying the IP or Mask Locally

Step	Action	Result
1.	Press **Edit.**	**Edit** button extinguishes momentarily and then flashes.
2.	Use left and right cursor buttons to navigate to the appropriate number.	Number displayed.
3.	Use up and down cursor buttons to change the number as required.	Correct number displayed.
4.	Press **Save.**	**Save** button extinguishes momentarily and the IP address is saved.

2.7.2 Rear Panel

The rear panel of each QAM modulator assembly is fitted with an LED which provides an indication of each QAM connector status. The action of this LED is described in *Chapter 4, Alarms*.

In addition to this, each Ethernet connector is fitted with two LEDs. The green LED indicates the channel status and the amber LED indicates channel activity.

Operating the EQ8096 Using the Web Browser

Chapter 3

Contents

3.1	Introduction	3-5
3.2	Establishing a Connection	3-5
3.2.1	Assigning a Control IP Address	3-5
3.2.2	Changing the IP Address	3-6
3.2.3	Opening the Web Browser	3-6
3.3	Web Page Menus	3-7
3.3.1	Status	3-7
3.3.2	Device Info	3-7
3.3.2.1	Main Tabbed Page	3-7
3.3.2.2	Setting the Date and Time	3-8
3.3.2.3	Control Port Settings	3-9
3.3.2.4	CA Port Main	3-10
3.3.2.5	Alarms	3-11
3.3.2.6	Trap Destination Table	3-11
3.3.2.7	Set SNMP Community Name	3-11
3.3.2.8	Version Information	3-11
3.3.2.9	Event Log	3-11
3.3.2.10	Set Unit Name	3-12
3.3.2.11	Set Authentication parameters	3-12
3.3.2.12	License Key (Optional)	3-12
3.3.2.13	Sys Log Server	3-12
3.3.3	Data Port Settings	3-12
3.3.3.1	Data Port 1-4	3-13
3.3.3.2	Data MAC Statistics	3-13
3.3.4	Modulation Settings	3-14
3.3.4.1	Main Tabbed Page	3-14
3.3.4.2	Modulator Card 1-8	3-14
3.3.4.3	RF Outputs	3-15
3.4	TS Construction Page Options	3-16
3.4.1.1	PID Range Selection	3-16
3.4.1.2	Output Transport Stream ID	3-17
3.4.1.3	Transport Streams (TSn)	3-17
3.4.2	Input Port to RF Output Card QAM Channel Assignment	3-19
3.4.3	Stream Mode (VoD/SPTS)	3-21
3.4.3.1	Program Number Mode	3-22
3.4.3.2	Modify Program Count	3-22
3.4.3.3	Selecting Between SDV and Standard Mode	3-22

3.4.4 Broadcast Mode 3-23
3.4.4.1 Modify Program Count 3-23
3.4.4.2 Modify Program Configuration 3-24
3.4.4.3 Modify Manual PID Configuration (Filtered mode only) 3-25
3.4.4.4 Remapping Any PID Within a Replicated Stream (Global SI) 3-26
3.4.4.5 Modify PSIG Configuration 3-28
3.4.5 DEPI/M-CMTS Mode 3-29
3.4.5.1 Overview 3-29
3.5 Conditional Access Tabbed Page 3-29
3.5.1 Overview 3-29
3.5.2 CA ECMG Settings 3-30
3.5.3 CA Settings 3-31
3.6 Engineering Tabbed Page 3-32
3.6.1 Overview 3-32
3.6.1.1 Software Watchdog 3-32
3.6.1.2 Debug Event Flags 3-32
3.6.1.3 SDV controls 3-33
3.6.1.4 Unit Reset 3-33
3.6.1.5 Advanced Parameter Functions 3-33
3.6.1.6 PSI Debug Functions 3-34
3.7 TS Input Assignments Tabbed Page 3-34

List of Figures

Figure 3.1 Status Web Page 3-7
Figure 3.2 Device Info Tabbed Web Page 3-8
Figure 3.3 Control Port Settings Tabbed Page 3-8
Figure 3.4 Set Unit Date / Time Web Page 3-9
Figure 3.5 Global Control Port Settings 3-10
Figure 3.6 Individual Control Port Settings 3-10
Figure 3.7 CA Port Main Settings Web Page 3-11
Figure 3.8 Data Port Settings Web Page 3-13
Figure 3.9 Dataport 1 Settings (similar for Dataport 2-4) Web Page 3-13
Figure 3.10 Dataport 1 Statistics (similar for Dataport 2-4) Web Page 3-14
Figure 3.11 Modulator Tabbed Web Page 3-14
Figure 3.12 Modulator Card Web Page (Similar for cards 2-8) 3-15
Figure 3.13 Output Card 1 Web Page (similar for Outputs 2-24 – as shown in Annex B) 3-15
Figure 3.14 Transport Stream Construction Web Page 3-16
Figure 3.15 PID Range Selection Web Page 3-17
Figure 3.16 Transport Stream ID Web Page 3-17
Figure 3.17 Transport Stream Component Set up (RPC mode) 3-18
Figure 3.18 Transport Stream (VoD mode) Component Set up 3-18
Figure 3.19 Populating a Transport Stream with MAC Sources 3-19
Figure 3.20 Assigning MAC Sources to a Program 3-20
Figure 3.21 MAC Assignment Overview 3-20
Figure 3.22 TS Setup Page 3-21
Figure 3.23 No MAC Assignments 3-21
Figure 3.24 Modify Program Count Set up 3-22
Figure 3.25 Transport Stream (Broadcast) Component Set up 3-23

Figure 3.26 Modify Program Count Page 3-24
Figure 3.27 Modify Program Configuration Page 3-24
Figure 3.28 MPTS Manual PID Mappings 3-25
Figure 3.29 SPTS Manual PID Mappings 3-25
Figure 3.30 Setting up of an MPTS on TS1 3-26
Figure 3.31 PID Remapping to TS1 (MPTS Mode) 3-27
Figure 3.32 PID Remapping to TS2 (MPTS Mode) 3-27
Figure 3.33 PID Remapping (SPTS Mode) 3-28
Figure 3.34 Modify PSIG Configuration 3-29
Figure 3.35 Conditional Access Tabbed Web Page 3-29
Figure 3.36 CA ECMG Settings Web Page 3-30
Figure 3.37 CA Settings Web Page 3-31
Figure 3.38 Engineering Tabbed Web Page 3-32
Figure 3.39 Debug Event Flags Web Page 3-33
Figure 3.40 Advanced Parameter Functions Web Page 3-33
Figure 3.41 TS Input Assignments Web Page 3-35

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3.1 Introduction

Standard configuration instructions are given in the User Guide. This chapter gives further information on the operation of the unit and describes additional functions not required for everyday operation.

3.2 Establishing a Connection

3.2.1 Assigning a Control IP Address

All EQ8096 units are shipped with an invalid Control Port IP address of 0.0.0.0. This must be configured to a local valid IP address before the product can be fully configured. This can be performed using the Front Panel Keypad (see *Table 2.6*) or via RS-232:

1. Connect a cable between the Host Status port on the EQ8096 (9-way male D-Type) and a local PC using a straight through RS-232 cable.
2. Using a suitable terminal emulator on the PC, Set up the communication parameters.

Note: The serial port communications defaults to 115200 bit/s, 8 bit data, no parity, 1 stop bit.

3. Power cycle the EQ8096. The terminal emulator will display a boot sequence that will show the software version and control port IP settings. If the IP address is still at the factory default of 0.0.0.0 for all 4 ports, then the user will be required to assign a valid address to any of these.
4. Using the terminal, the user should enter the local IP address allocated to the unit using the command IPn xxx.xxx.xxx.xxx (e.g. IP3 172.17.124.3) and then press return. ‘n’ is the control port index (1 – 4) as outlined below:

   a CA Main

   b CA Redundant

   c Control Main

   d Control redundant

   e The IP settings are effective immediately.

Note: Since the default Gateway IP address is not set in the unit, the user will only be able to establish an Ethernet connection from an IP address on the same Sub-net. See *Section 3.2.2* for description of how to set Subnet mask + gateway address.

3.2.2 Changing the IP Address

If the user accidentally sets the local address incorrectly, the EQ8096 may not be accessible via the browser. The IP address can be changed using the Front Panel Keypad (see *Table 2.6*) or using the following procedure:

1. Open a terminal emulation application on the PC.

Note: The EQ8096 serial port communications defaults to 115200 bit/s, 8 bit data, no parity, 1 stop bit.

2. Power cycle the EQ8096.
3. The terminal emulator will display a boot sequence that gives the current Control port settings.
4. Using the terminal, the user should enter the local IP address allocated to the unit using the command IPn xxx.xxx.xxx.xxx
   (e.g. IP 172.17.124.3) and then press return.
5. If required, the user may enter the local IP subnet mask allocated to the unit using the command IPMASKn xxx.xxx.xxx.xxx
   (e.g. IPMASK 255.255.0.0) and then press return.
6. If required, the user may enter the local IP gateway mask allocated to the unit using the command IPGATEWAY xxx.xxx.xxx.xxx
   (e.g. IPGATEWAY 192.168.63.254) and then press return.
7. The new IP settings will become active immediately. ‘n’ is the control port index (1 – 4) as outlined below:

   a CA Main

   b CA Redundant

   c Control Main

   d Control redundant

3.2.3 Opening the Web Browser

Once the EQ8096 IP address has been activated, the user can open a web browser application and enter the following URL address: **http://assigned IP address** (where **assigned IP address** is the address set by the user).

This gives access to the web pages described in this chapter.

Note: If connecting through a LAN ensure that the option to use proxy server is switched off.

3.3 Web Page Menus

3.3.1 Status

This is the start-up web page and shows the current status of the unit. The serial number, user-defined unit name (if entered) and system up-time are displayed, as well as any unmasked alarm conditions. Modified font usage within main text, headings, and tables, to accommodate company re-brand.

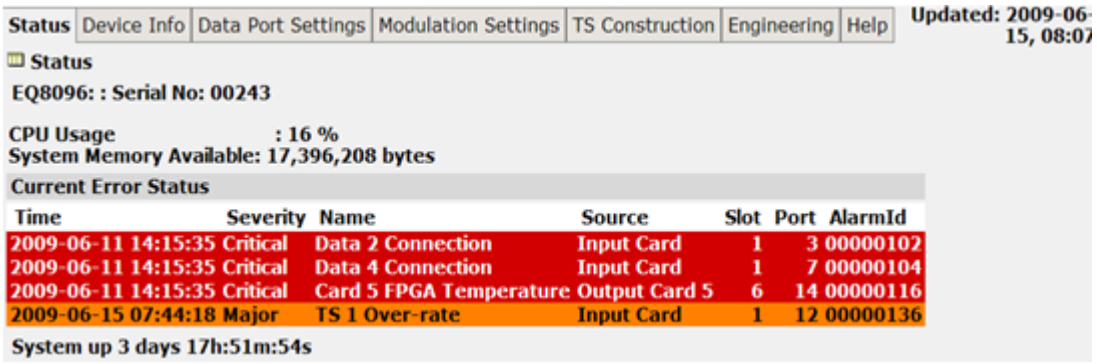

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-15, 08:07
Status
EQ8096: : Serial No: 00243
CPU Usage : 16 %
System Memory Available: 17,396,208 bytes
Current Error Status
Time Severity Name Source Slot Port AlarmId
2009-06-11 14:15:35 Critical Data 2 Connection Input Card 1 3 00000102
2009-06-11 14:15:35 Critical Data 4 Connection Input Card 1 7 00000104
2009-06-11 14:15:35 Critical Card 5 FPGA Temperature Output Card 5 6 14 00000116
2009-06-15 07:44:18 Major TS 1 Over-rate Input Card 1 12 00000136
System up 3 days 17h:51m:54s

Figure 3.1 Status Web Page

3.3.2 Device Info

3.3.2.1 Main Tabbed Page

Figure 3.2 shows the main tabbed web page for the Device Information. This gives access to further tabbed pages.

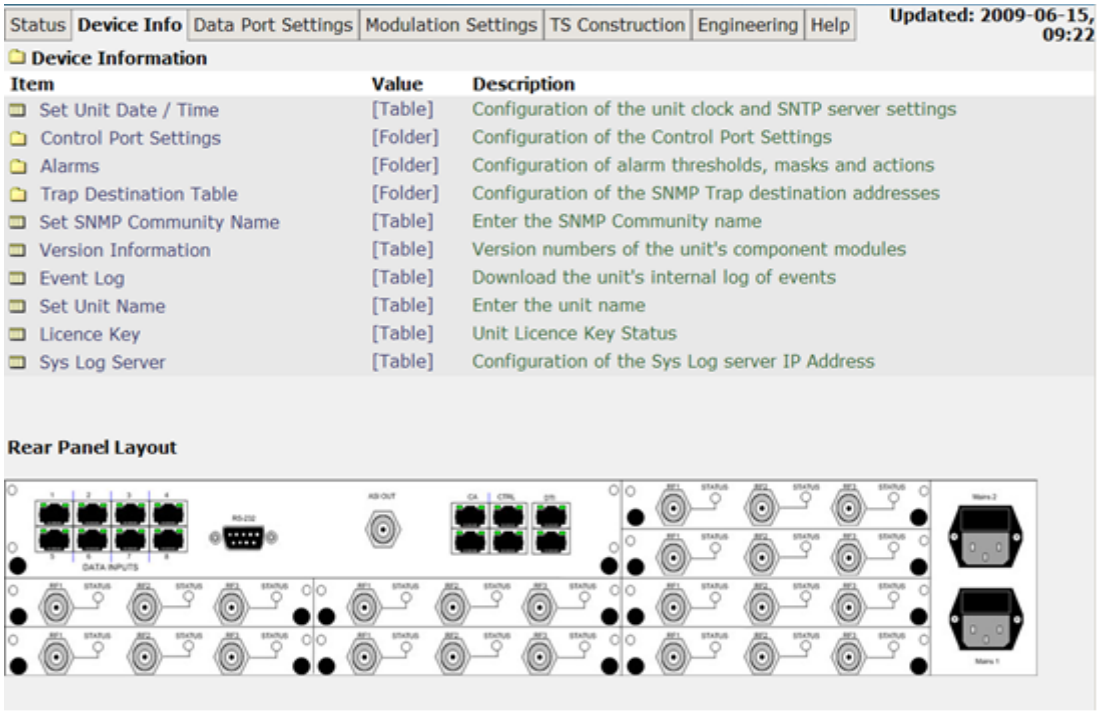


Figure 3.2 Device Info Tabbed Web Page

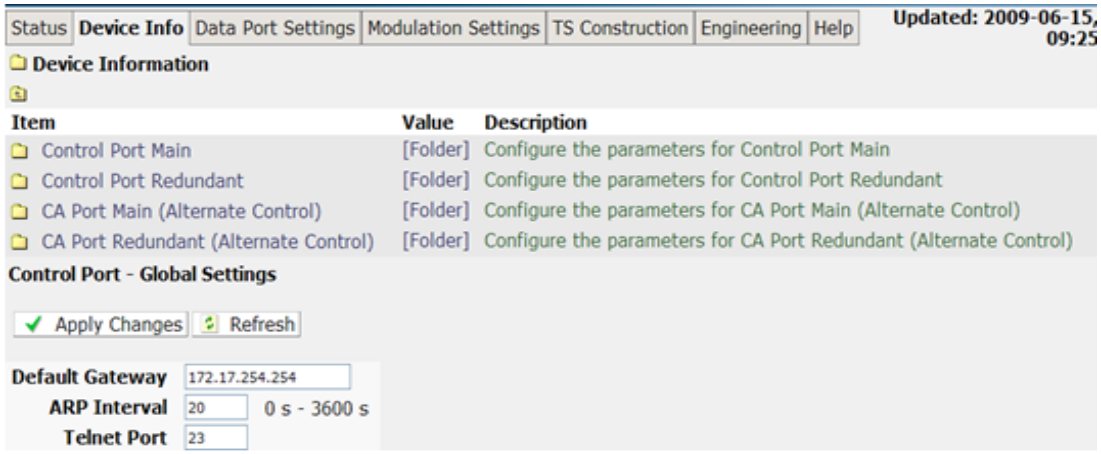


Figure 3.3 Control Port Settings Tabbed Page

3.3.2.2 Setting the Date and Time

This web page is found on the **Device Info** tabbed page.

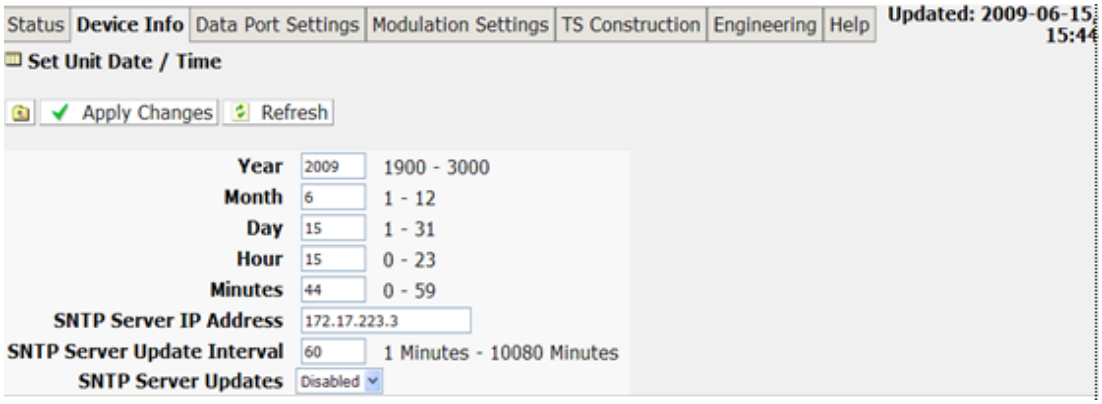


Figure 3.4 Set Unit Date / Time Web Page

The EQ8096 hardware uses a real-time clock to provide time and date functionality. The clock values are retained in non-volatile memory.

A user parameter is provided to allow the clock to be maintained either by the application software or by using the Simple Network Time Protocol (SNTP RFC-2030) via the Ethernet Control interface.

There is a parameter for specifying the SNTP Server IP address if the clock is to be slaved to the server.

The time is entered as a complete set of parameters (as shown in *Figure 3.4*). The Time is auto-incremented once entered or it can be overwritten if a time-server is enabled and connected.

Notes: This page does not automatically refresh itself. If the page is left displayed the initial values in the time form remain unchanged as time passes, and will correspond to the page update time stamp in the top right hand corner until the operator enters new values, or uses the web page refresh button to get the current values from the unit.

If the next action the operator performs after applying changes is to press the browser refresh button, the browser action will be to re send the last URL, which will be a repeat of the time change form and the unit will be set to this time again.

The unit time and date is only used to time stamp log files and is not transferred into the generated transport stream.

3.3.2.3 Control Port Settings

To review the Control Port settings, on the **Device Info** tabbed page, click Control Port Settings to display the web page shown in *Figure 3.5.* The Top-Level menu offers control for the Default Gateway (for control/management) and for specifying ARP request interval. It also offers the option to inhibit the overwrite of the CA IP settings after a redundancy switch.

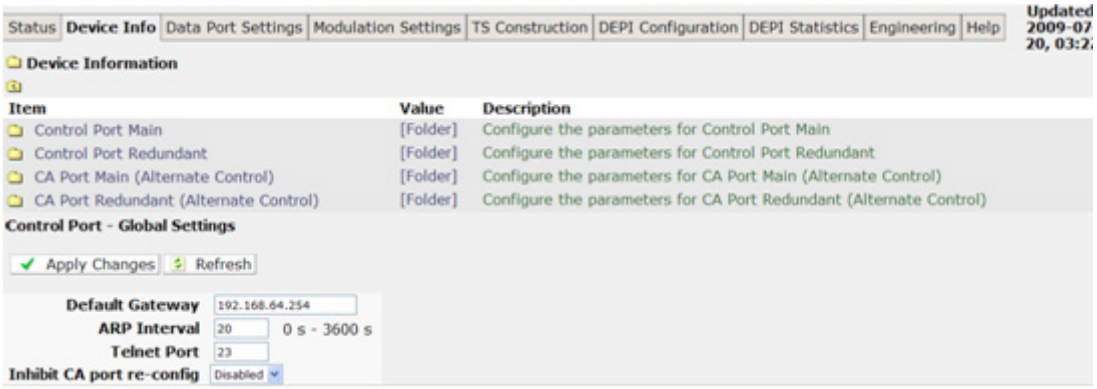


Figure 3.5 Global Control Port Settings

Each of the 4 ports can have their IP address and Mask changed. The link status of the port is also shown in *Figure 3.6*.

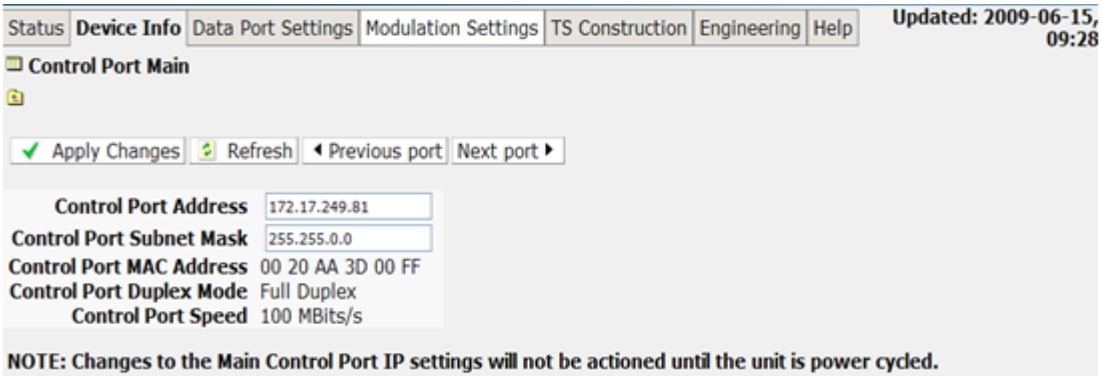


Figure 3.6 Individual Control Port Settings

Caution!

If the Main Control Port IP address is changed, the new address will not take effect until the unit is power cycled. The Control port will remain on the original IP address until this action is performed.

3.3.2.4 CA Port Main

To review the CA Port Main settings on the **Device info 2** page, click CA Port Main to display the web pages shown in *Figure 3.7.*

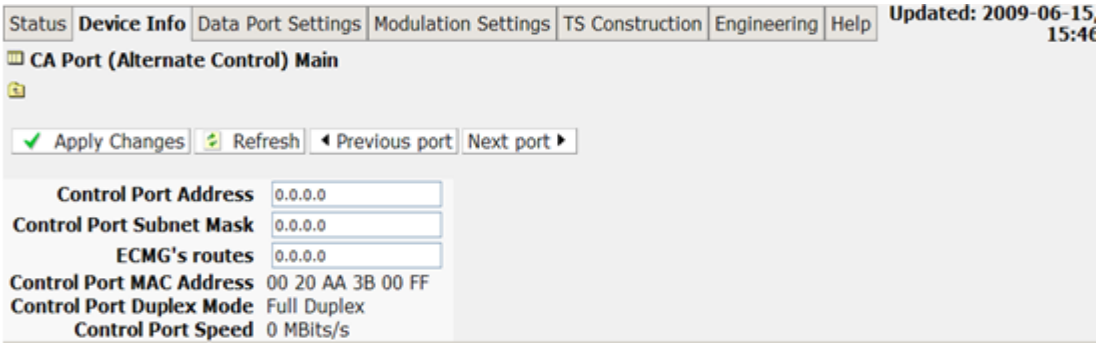


Figure 3.7 CA Port Main Settings Web Page

Caution!

If an attempt is made to change the control port IP address the network connection to that particular port will be lost.

3.3.2.5 Alarms

The EQ8096 software provides functionality for handling, logging and displaying application alarms. All active alarms are displayed on the start-up Status page (see *Section 3.3.1*). Further details are given in *Chapter 4*.

3.3.2.6 Trap Destination Table

For information on the Trap Destination Table, see *Chapter 4*.

3.3.2.7 Set SNMP Community Name

This page allows the user to configure SNMP access privileges for up to 5 different SNMP Communities. Each Community can be allocated an Operator defined name and either of the following:

- READ WRITE NOTIFY (FULL ACCESS)
- READ ONLY
- READ WRITE

3.3.2.8 Version Information

This page provides software, firmware and hardware version details for the unit.

It also gives the unit serial number and indicates whether DVBCA is enabled or disabled.

3.3.2.9 Event Log

System events are sent to an event log and are prioritized to permit filtering. Logged entries are time and date stamped, and stored in a volatile file system. The events can also be sent to a registered SysLog server (see below).

3.3.2.10 Set Unit Name

A 32 bit alphanumeric name for the unit can be set to aid unit identification. This is displayed on the status page.

3.3.2.11 Set Authentication parameters

When enabled (license Key required), the operator can specify the Username and Password to enable HTTP access and control of the EQ8096.

3.3.2.12 License Key (Optional)

Can be used to input a License Key generated by Ericsson, based on the unit's Unique Serial Number.

The unit is shipped with CA enabled if the option EQ8096/SWO/DVBCA has been ordered at time of purchase.

The unit is shipped with DTI/M-CMTS functionality enabled if the option EQ8096/HWO/DTI has been ordered at time of purchase.

The unit can be licensed to fully utilize Output Option cards supporting up to 1GHz frequencies when the option EQ8096/SWO/12QAM/1GHZ has been ordered. This option does not require ordering at build time.

The unit can be licensed to operate with Web Browser Authentication. This option does not require ordering at build time and can be licensed free of charge through Customer Support.

If any of these options were not originally ordered but are subsequently required, it is possible to enter a new license key to enable the required functionality, using this page.

3.3.2.13 Sys Log Server

Error logging and parameter change information specific to a particular user can be forwarded to a dedicated SysLog server.

3.3.3 Data Port Settings

This provides the facility to set the required Data Port parameters: Port Address and Subnet mask. It also offers the option to inhibit the overwrite of the Data port IP settings after a redundancy switch.

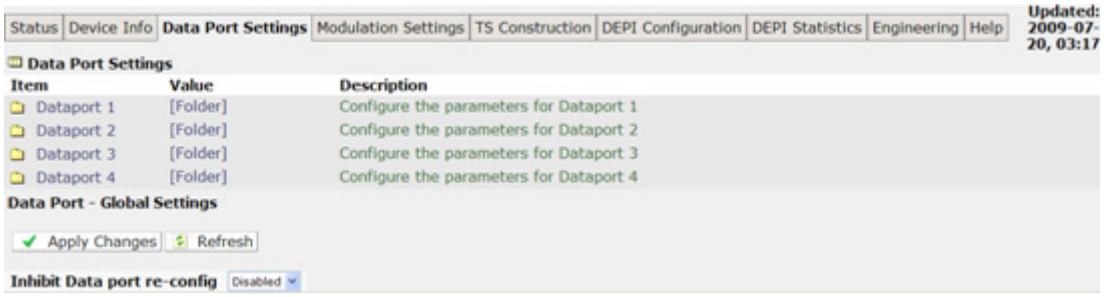


Figure 3.8 Data Port Settings Web Page

3.3.3.1 Data Port 1-4

This provides the facility to set the required Data Port parameters: Port Address and Subnet mask for both the Primary and redundant Secondary.

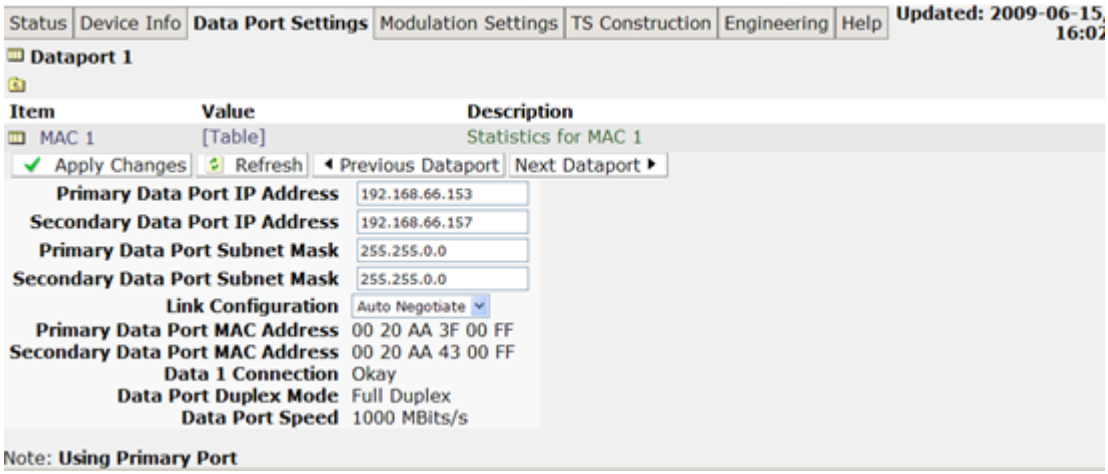


Figure 3.9 Dataport 1 Settings (similar for Dataport 2-4) Web Page

Notes: The user configurable parameter that selects the required input is stored so that the correct configuration is restored on power up.

Redundant Data ports can have the same attributes as the Main in the pair (MAC address, IP parameters), or separate allocation of IP and mask.

When the unit is ordered with SFP data connectors, SFP modules are not included as standard.

3.3.3.2 Data MAC Statistics

The page provides packet statistics for the selected MAC. The page provides details on Current, Minimum, Maximum and Average rates for both Received bits per seconds and Received Packets per second.

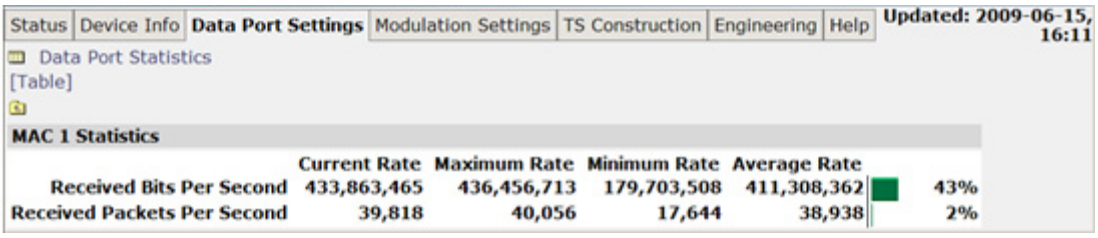


Figure 3.10 Dataport 1 Statistics (similar for Dataport 2-4) Web Page

3.3.4 Modulation Settings

3.3.4.1 Main Tabbed Page

This tabbed page gives access to the settings affecting the modulator.

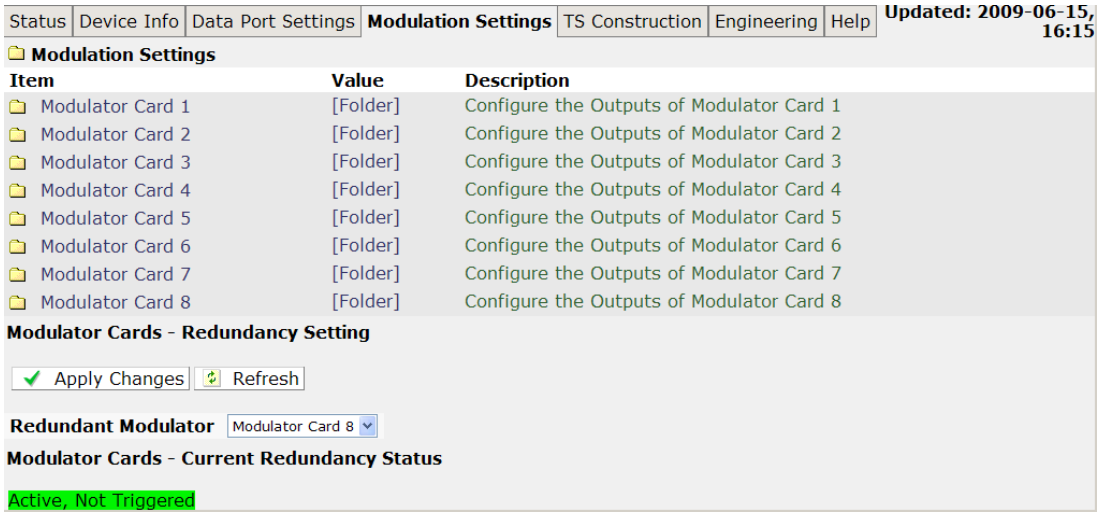


Figure 3.11 Modulator Tabbed Web Page

Note: The modulator parameters that can be set are dependent on the selected modulation mode.

3.3.4.2 Modulator Card 1-8

The status of each RF output can be reviewed on these web pages.

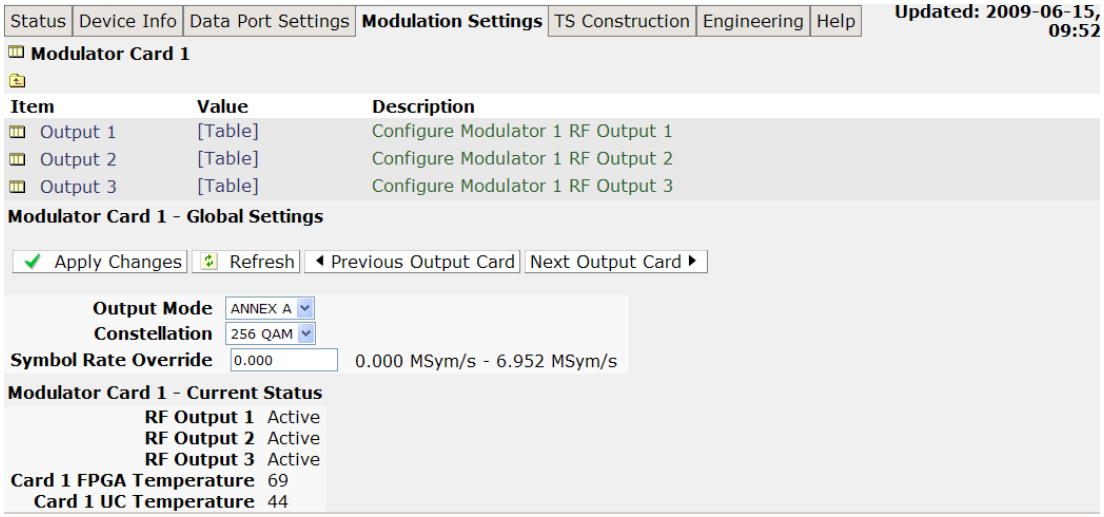


Figure 3.12 Modulator Card Web Page (Similar for cards 2-8)

3.3.4.3 RF Outputs

The settings of each RF output can be reviewed on these web pages.

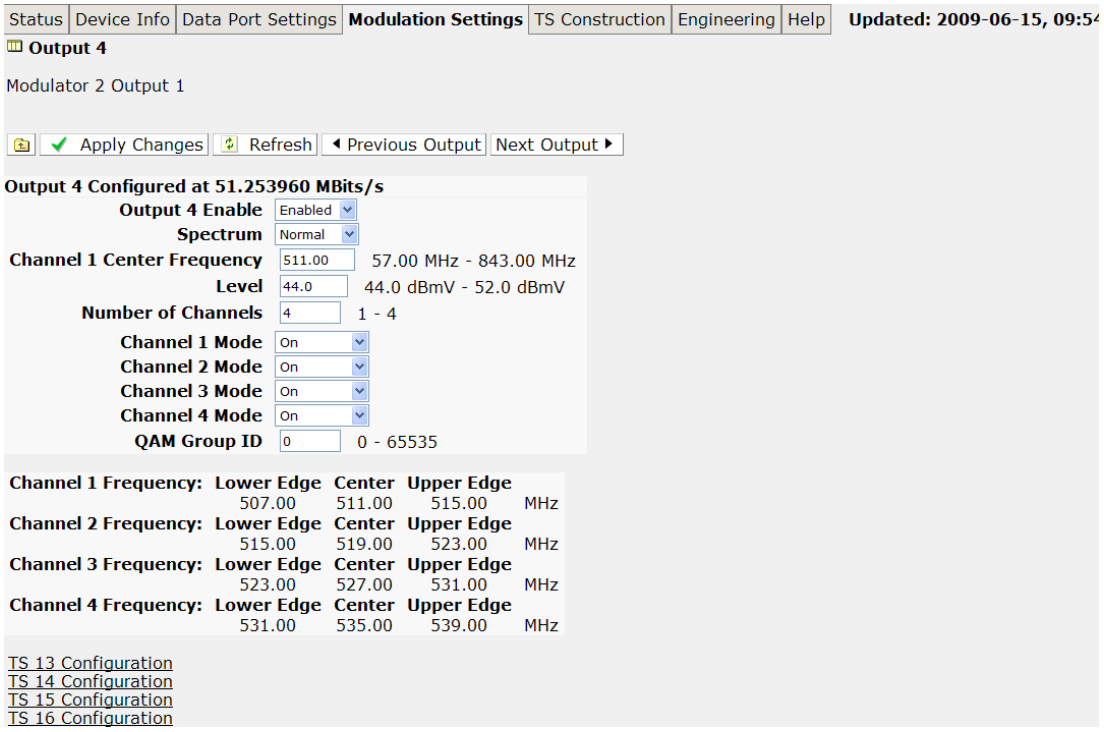


Figure 3.13 Output Card 1 Web Page (similar for Outputs 2-24 – as shown in Annex B)

The Output Channel Mode, Centre Frequency and Output Level for each RF Output port can be set individually.

The Output Channel Mode allows any one of up to four transport streams on the RF output to be disabled.

The contents of the modulated transport streams can be displayed by clicking on the appropriate link at the foot of the page.

When the output (i.e. Output Channel Mode) is disabled, there is no output from that connector.

When the RF connector output is enabled, transport streams are mapped to a specific channel on a particular RF output. These are defined in the tables in *Chapter 1, Section 1.3, Output Channel Mappings.*

Notes: There is no support for individually setting the output power of each individual channel in a group.

The displayed Output power level in dBmV is the power level per QAM channel.

The centre frequency is the frequency at the centre of Channel 1.

Transport Streams are built up using information under TS Construction.

The output port can be configured to source a sine-wave test signal at the frequency and output level configured for that output. When in this mode, RF compliancy to DOCSIS 3.0 DRFI may be compromised.

3.4 TS Construction Page Options

The TS Construction tabbed page provides options for configuring the output Transport Streams.

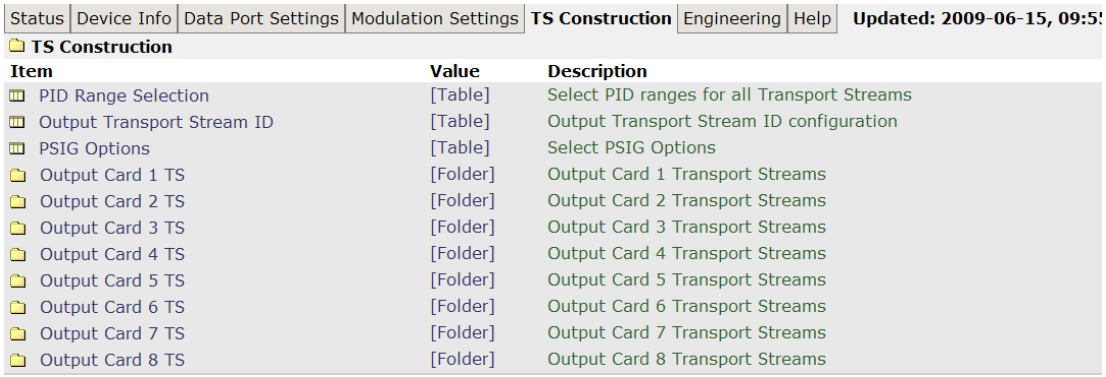


Figure 3.14 Transport Stream Construction Web Page

3.4.1.1 PID Range Selection

This provides the user the option to specify the PID remapping mode to be used for the PMT, ES and ECM (where applicable) for each output TS. Two modes are available:

- Range remapping – a static range from the bases specified is used for remapping.

- Cyclic remapping – a rotating range from the bases specified is used for remapping (ensures that service stop/starts use a new set of PIDs).

If no value is entered the default value that appears on the GUI will be used.

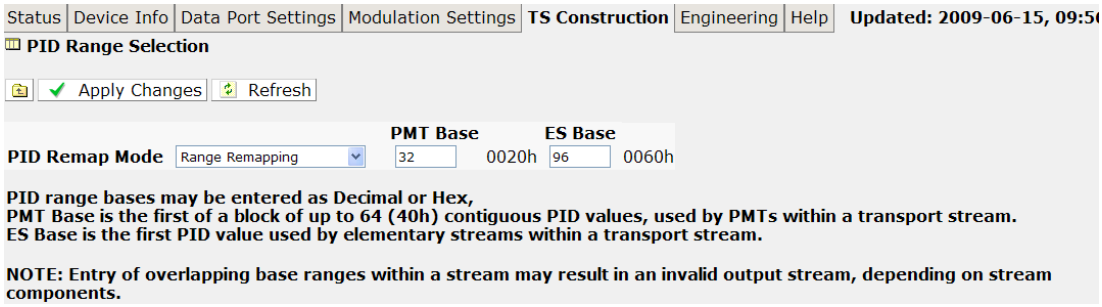

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-15, 09:5
PID Range Selection
Apply Changes
Refresh
PMT Base
ES Base
PID Remap Mode
Range Remapping
32
0020h
96
0060h
PID range bases may be entered as Decimal or Hex,
PMT Base is the first of a block of up to 64 (40h) contiguous PID values, used by PMTs within a transport stream.
ES Base is the first PID value used by elementary streams within a transport stream.
NOTE: Entry of overlapping base ranges within a stream may result in an invalid output stream, depending on stream components.

Figure 3.15 PID Range Selection Web Page

3.4.1.2 Output Transport Stream ID

Each generated output Transport Stream can be given an identifier. This value is set using the transport stream ID as required. Values can be set in the range 0 – 65535. This value appears in the generated output PAT.

If no user value is entered the default value that appears on the GUI will be used.

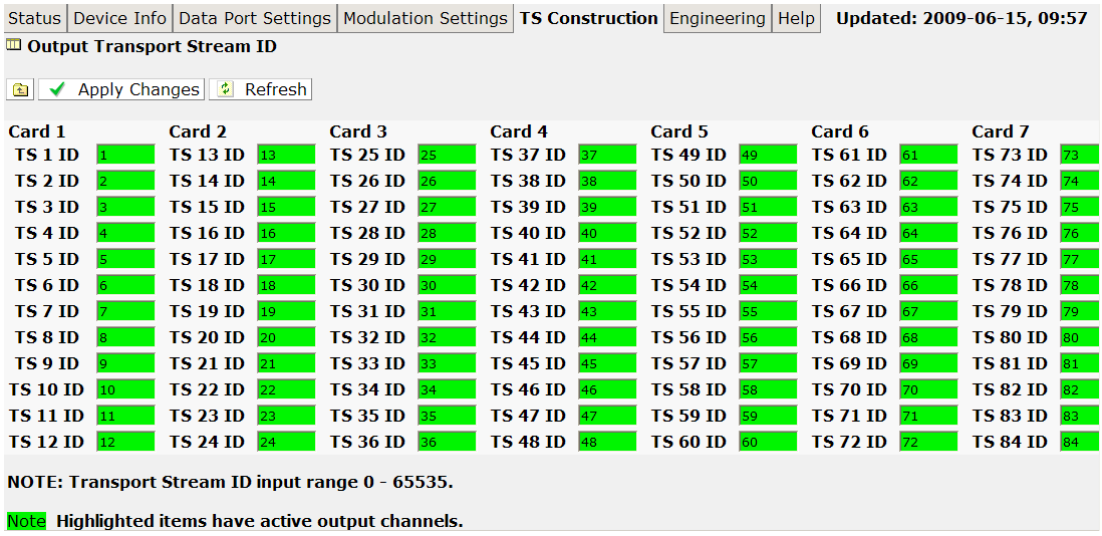


Figure 3.16 Transport Stream ID Web Page

3.4.1.3 Transport Streams (TSn)

Configure the content of each Transport Stream by entering a multicast address and UDP port number for each of the input flows to be included in the output TS.

The status of each of the UDP Audio/Video and UDP Data ports is shown for each flow with its associated bit rate.

A summary of the output rate available (defined by the modulation settings), actual component rate and the amount of free space available (null packets) is also displayed for information.

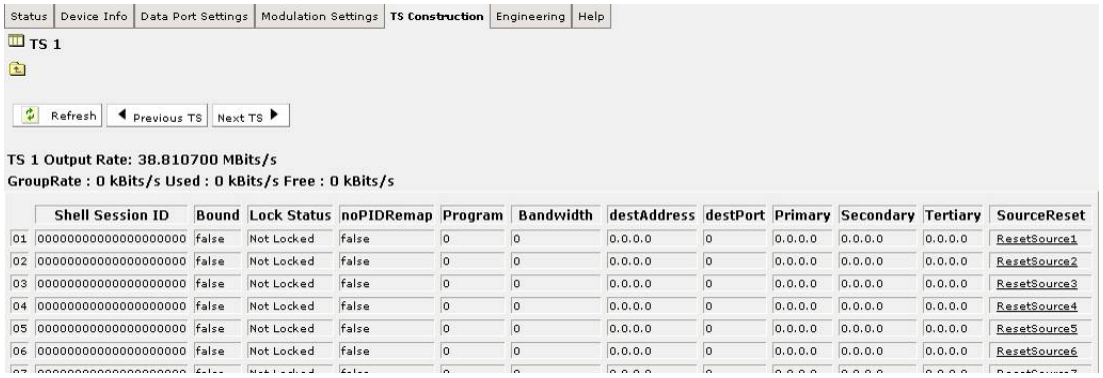

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
TS 1
Refresh
Previous TS
Next TS
TS 1 Output Rate: 38.810700 MBits/s
GroupRate : 0 kBits/s Used : 0 kBits/s Free : 0 kBits/s
Shell Session ID
Bound
Lock Status
noPIDRemap
Program
Bandwidth
destAddress
destPort
Primary
Secondary
Tertiary
SourceReset
01 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource1
02 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource2
03 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource3
04 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource4
05 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource5
06 0000000000000000000 false Not Locked false 0 0 0.0.0.0 0 0.0.0.0 0.0.0.0 0.0.0.0 ResetSource6

Figure 3.17 Transport Stream Component Set up (RPC mode)

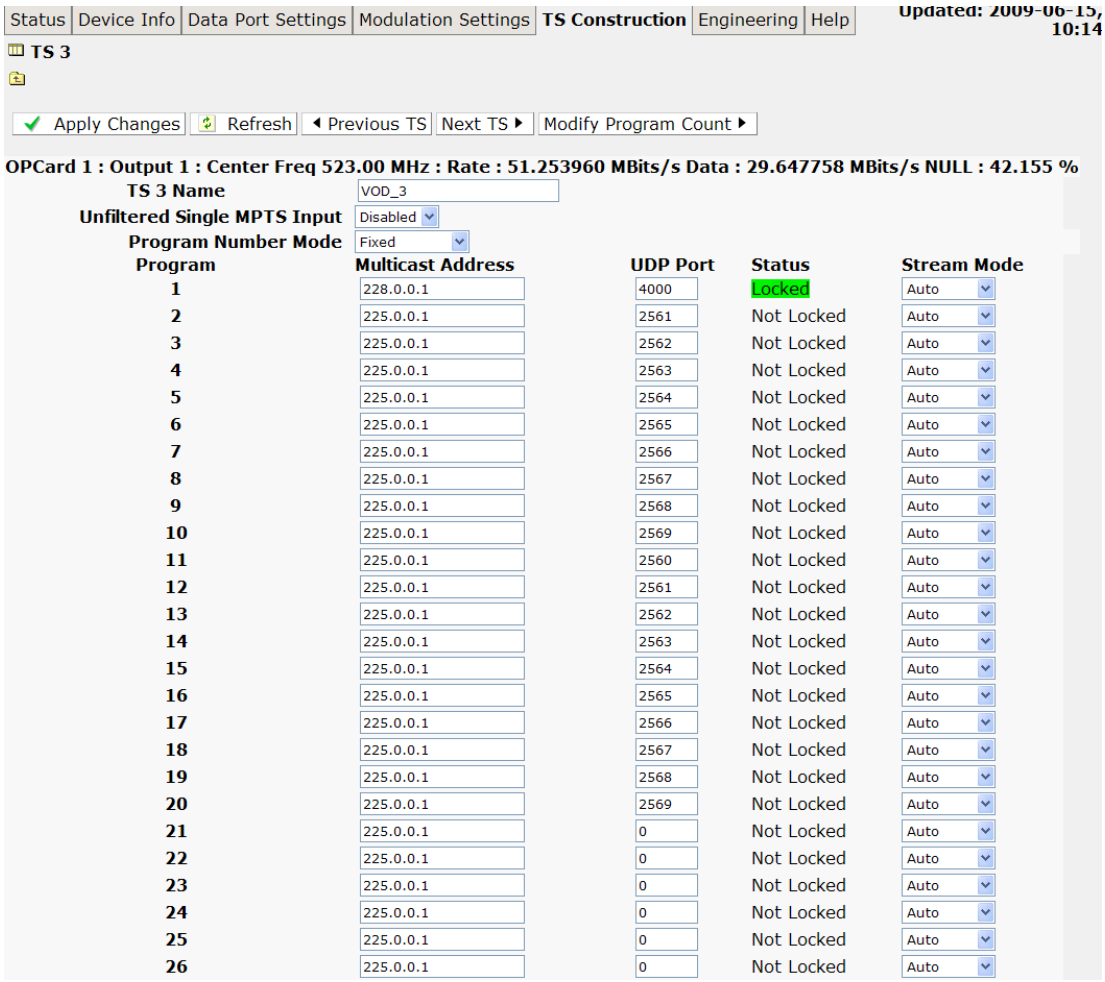

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-15, 10:14
TS 3
Apply Changes
Refresh
Previous TS
Next TS
Modify Program Count
OPCard 1 : Output 1 : Center Freq 523.00 MHz : Rate : 51.253960 MBits/s Data : 29.647758 MBits/s NULL : 42.155 %
TS 3 Name
VOD_3
Unfiltered Single MPTS Input
Disabled
Program Number Mode
Fixed
Program
Multicast Address
UDP Port
Status
Stream Mode
1 228.0.0.1 4000 Locked Auto
2 225.0.0.1 2561 Not Locked Auto
3 225.0.0.1 2562 Not Locked Auto
4 225.0.0.1 2563 Not Locked Auto
5 225.0.0.1 2564 Not Locked Auto
6 225.0.0.1 2565 Not Locked Auto
7 225.0.0.1 2566 Not Locked Auto
8 225.0.0.1 2567 Not Locked Auto
9 225.0.0.1 2568 Not Locked Auto
10 225.0.0.1 2569 Not Locked Auto
11 225.0.0.1 2560 Not Locked Auto
12 225.0.0.1 2561 Not Locked Auto
13 225.0.0.1 2562 Not Locked Auto
14 225.0.0.1 2563 Not Locked Auto
15 225.0.0.1 2564 Not Locked Auto
16 225.0.0.1 2565 Not Locked Auto
17 225.0.0.1 2566 Not Locked Auto
18 225.0.0.1 2567 Not Locked Auto
19 225.0.0.1 2568 Not Locked Auto
20 225.0.0.1 2569 Not Locked Auto
21 225.0.0.1 0 Not Locked Auto
22 225.0.0.1 0 Not Locked Auto
23 225.0.0.1 0 Not Locked Auto
24 225.0.0.1 0 Not Locked Auto
25 225.0.0.1 0 Not Locked Auto
26 225.0.0.1 0 Not Locked Auto

Figure 3.18 Transport Stream (VoD mode) Component Set up

3.4.2 Input Port to RF Output Card QAM Channel Assignment

Any to any mapping enables the unit to map any transport streams on any Input Port to any RF Output Card QAM channel.

Navigation to different Transport Stream MAC assignment pages is configured using the TS Input Assignments tabbed page, see *Section 3.7.*

Figure 3.19 show the MAC assignment page which allows the user to populate a Transport Stream with different MAC sources. The maximum number of Programs that can be assigned a MAC input source is 64.

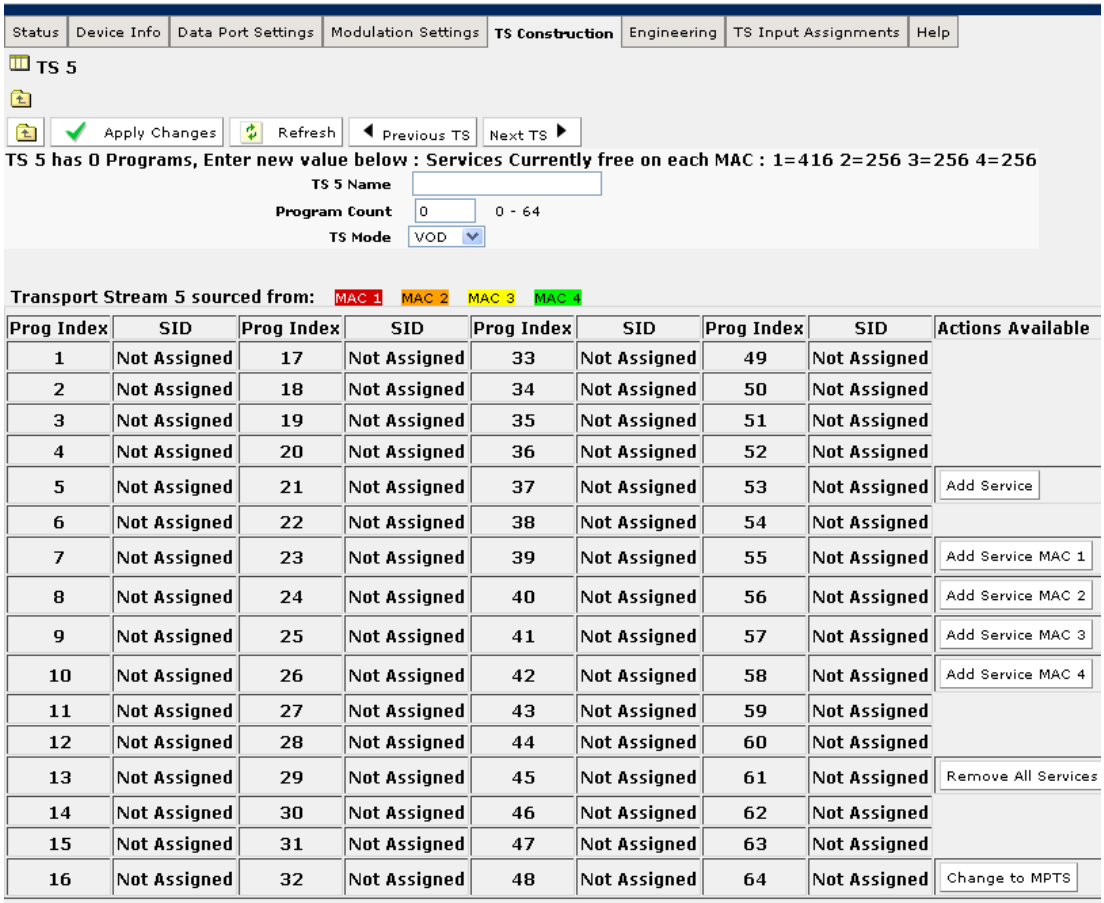


Figure 3.19 Populating a Transport Stream with MAC Sources

Under the actions available page are the options available to the user to edit. The **Remove All Services** option clears all the MAC sources associated with particular TS, in the case above TS5.

Figure 3.20 looks at the MAC assignment for TS1; where each one of the four MACs has been assigned to a program. Note how the color of each MAC clearly shows which program is sourced from which MAC. If the **Remove Service** button is pressed, Program 7 for TS1 would lose the assignment

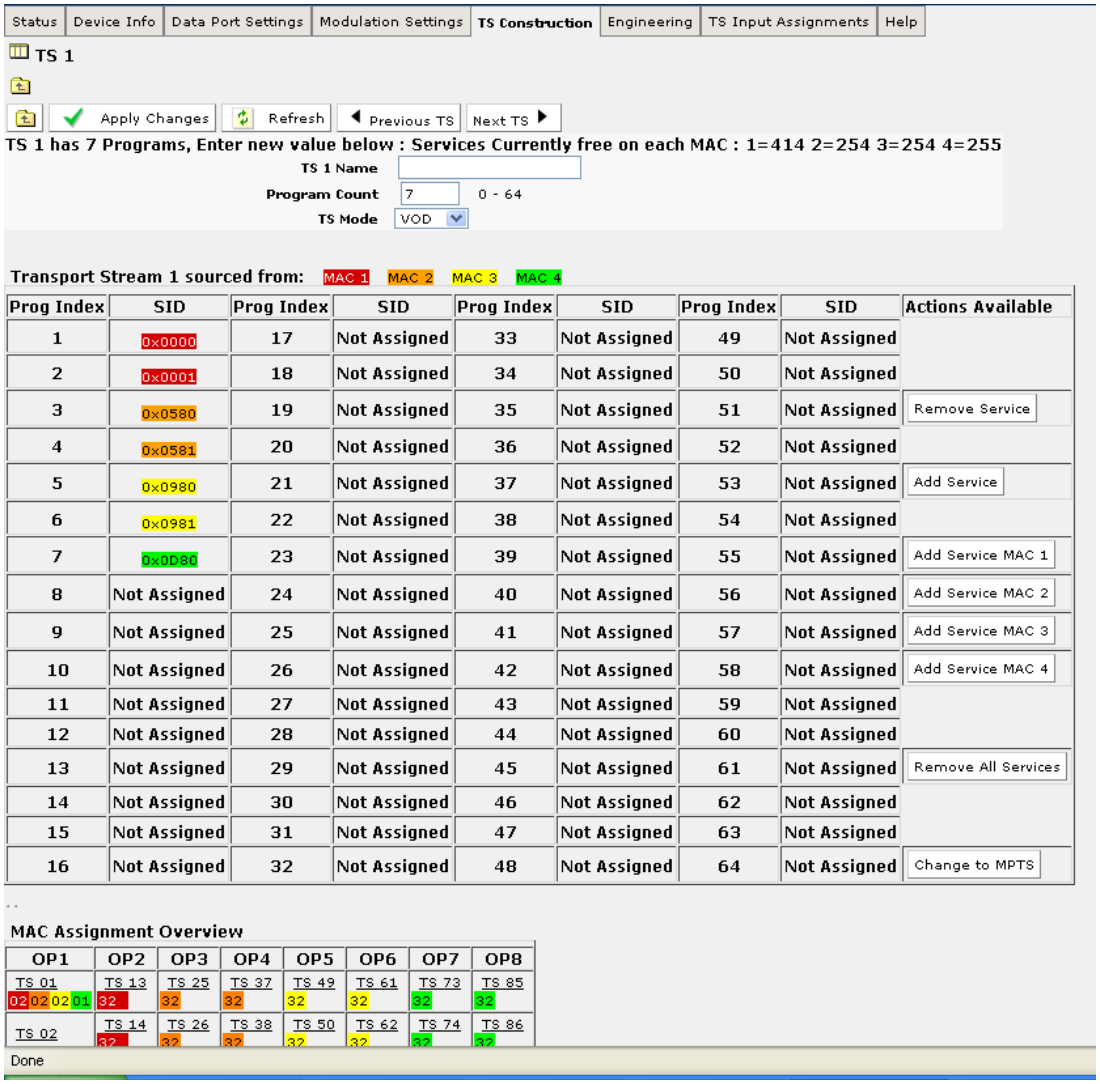


Figure 3.20 Assigning MAC Sources to a Program

Zooming in on to the MAC Assignment Overview the MAC source and number of MAC sources per MAC is defined on a per TS basis.

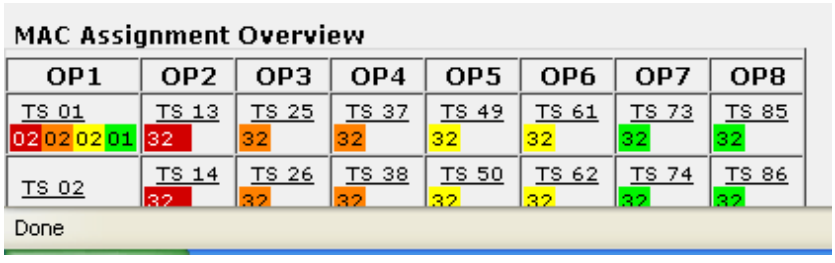


Figure 3.21 MAC Assignment Overview

The TS setup page where Multicast address and UDP Port settings are added show the number of Programs match the number of MAC assigned. By default this would be 32 but in *Figure 3.22* TS 1 has 7 Programs to reflect the number of MACs assigned in the MAC assignment page.

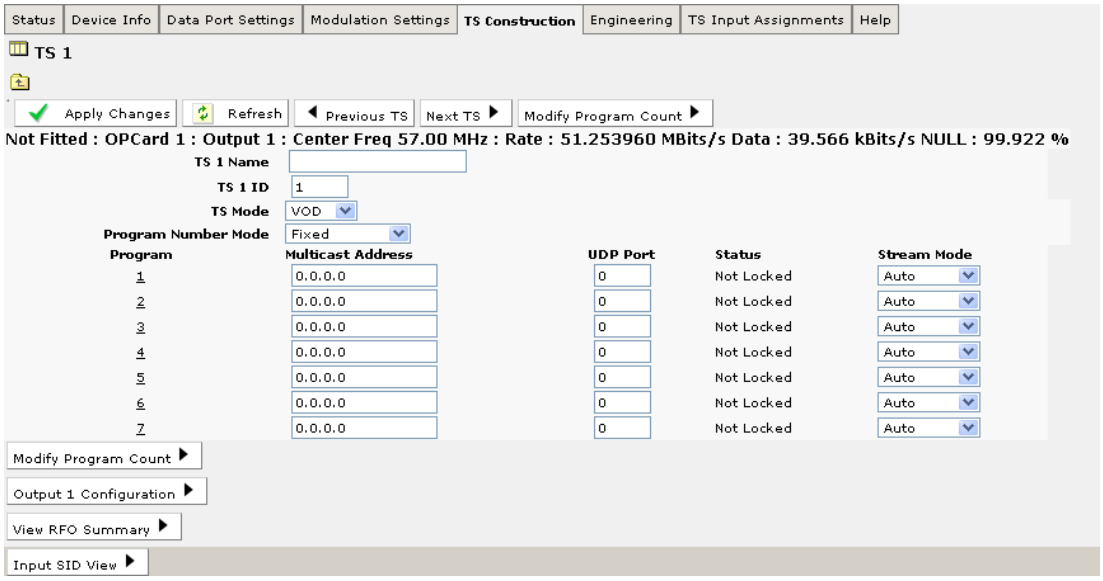


Figure 3.22 TS Setup Page

Figure 3.23 shows no programs for TS 2 this is because no MACs have been assigned to it.

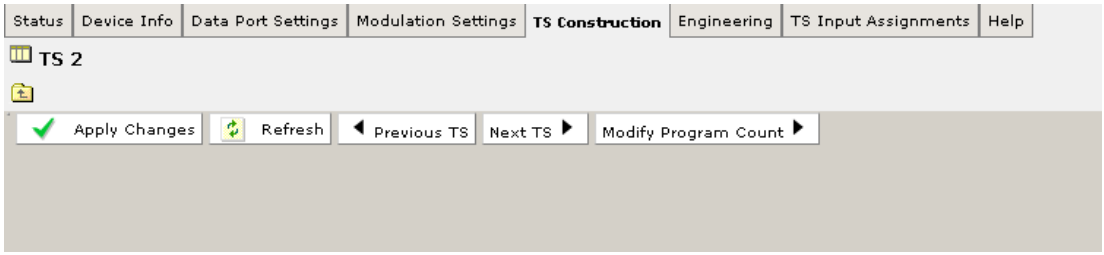


Figure 3.23 No MAC Assignments

3.4.3 Stream Mode (VoD/SPTS)

Each SPTS input can be individually set to be processed in any of 3 possible modes:

- **Auto** – the EQ8096 will employ the automatic PID remap mode chosen in *Section 3.4*.
- **Unfiltered** – the EQ8096 will pass-through ALL PIDs on the flow (including PSI), unmodified. This mode should be used when multiplexing OOB data or SI traffic.
- **Filtered** – the EQ8096 will process the stream as normal but no remapping will be performed. Only PIDs referenced within the stream's PSI will appear at the output.

Note: When operating in Unfiltered Mode, the user must be aware that ALL PIDs are passed through to the output, INCLUDING PSI. The user must be aware of all PID clashes, including PID 0 (PAT) on the output.

3.4.3.1 Program Number Mode

The program number allocation can be programmed into any of 3 possible modes:

- **Fixed** – the EQ8096 will change the output Program number to be the same as the Program Index as shown on the GUI (1-32 or 1-n when in extended mode).
- **Pass Thru** – the EQ8096 will simply pass the input Program number through to the Output Transport Stream.
- **User-defined** – the operator can specify the Program number for each service in the Output Transport Stream.

3.4.3.2 Modify Program Count

By default, each of the 96 Output Transport Streams supports the inclusion of up to 32 services. For denser Transport Streams, it is possible to allocate up to 64 services by entering the Modify Program Count page.

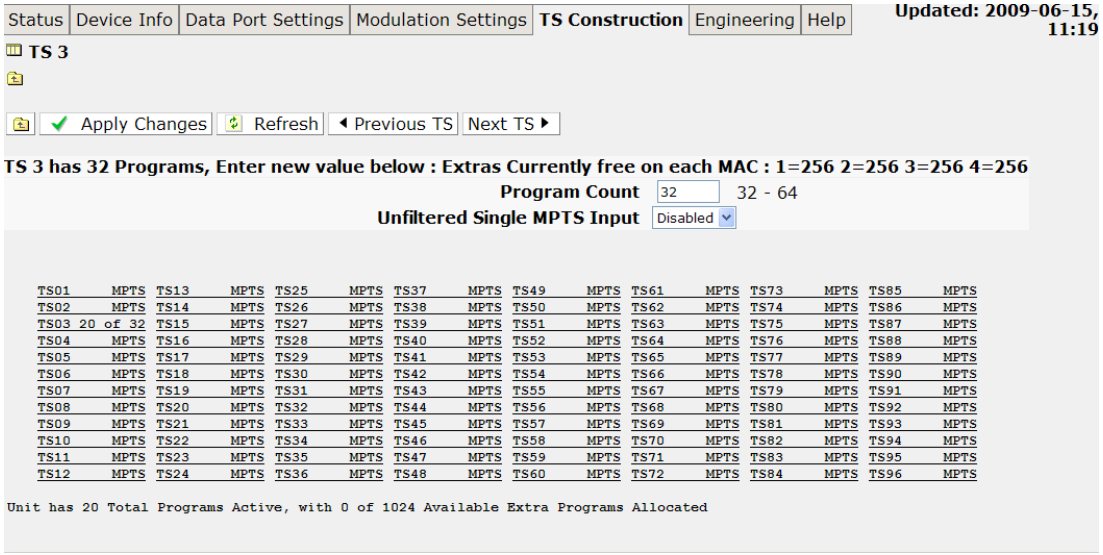

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-15, 11:19
TS 3
Apply Changes
Refresh
Previous TS
Next TS
TS 3 has 32 Programs, Enter new value below : Extras Currently free on each MAC : 1=256 2=256 3=256 4=256
Program Count
32
32 - 64
Unfiltered Single MPTS Input
Disabled
TS01 MPTS TS13 MPTS TS25 MPTS TS37 MPTS TS49 MPTS TS61 MPTS TS73 MPTS TS85 MPTS
TS02 MPTS TS14 MPTS TS26 MPTS TS38 MPTS TS50 MPTS TS62 MPTS TS74 MPTS TS86 MPTS
TS03 20 of 32 TS15 MPTS TS27 MPTS TS39 MPTS TS51 MPTS TS63 MPTS TS75 MPTS TS87 MPTS
TS04 MPTS TS16 MPTS TS28 MPTS TS40 MPTS TS52 MPTS TS64 MPTS TS76 MPTS TS88 MPTS
TS05 MPTS TS17 MPTS TS29 MPTS TS41 MPTS TS53 MPTS TS65 MPTS TS77 MPTS TS89 MPTS
TS06 MPTS TS18 MPTS TS30 MPTS TS42 MPTS TS54 MPTS TS66 MPTS TS78 MPTS TS90 MPTS
TS07 MPTS TS19 MPTS TS31 MPTS TS43 MPTS TS55 MPTS TS67 MPTS TS79 MPTS TS91 MPTS
TS08 MPTS TS20 MPTS TS32 MPTS TS44 MPTS TS56 MPTS TS68 MPTS TS80 MPTS TS92 MPTS
TS09 MPTS TS21 MPTS TS33 MPTS TS45 MPTS TS57 MPTS TS69 MPTS TS81 MPTS TS93 MPTS
TS10 MPTS TS22 MPTS TS34 MPTS TS46 MPTS TS58 MPTS TS70 MPTS TS82 MPTS TS94 MPTS
TS11 MPTS TS23 MPTS TS35 MPTS TS47 MPTS TS59 MPTS TS71 MPTS TS83 MPTS TS95 MPTS
TS12 MPTS TS24 MPTS TS36 MPTS TS48 MPTS TS60 MPTS TS72 MPTS TS84 MPTS TS96 MPTS
Unit has 20 Total Programs Active, with 0 of 1024 Available Extra Programs Allocated

Figure 3.24 Modify Program Count Set up

3.4.3.3 Selecting Between SDV and Standard Mode

The EQ8096 can be used in 2 environments; standard (manual/SNMP) control or using an SDV Server/ERM with the RPC protocol. This can be selected under the Engineering Tabbed Page (*Section 3.5*). The unit must be rebooted after this selection is made. The TS Construction Tabbed Page will appear more informative and does not permit user entry of parameters.

Notes: The software supports up to 64 programs/SPTSs per Transport Stream

When content is encrypted using the Conditional Access enabled license option, content appearing at the ASI monitor output is NOT encrypted (i.e. content is in the ‘Clear’)

3.4.4 Broadcast Mode

For each transport stream output it is possible to select a single MPTS input flow to appear at the output. The maximum bit rate of the input MPTS is 51.25 Mbps.

When the QAM Channel is to be used for processing a single MPTS then ‘Unfiltered Single MPTS Input’ should be enabled. The appropriate mode should then be chosen (Unfiltered or Filtered).

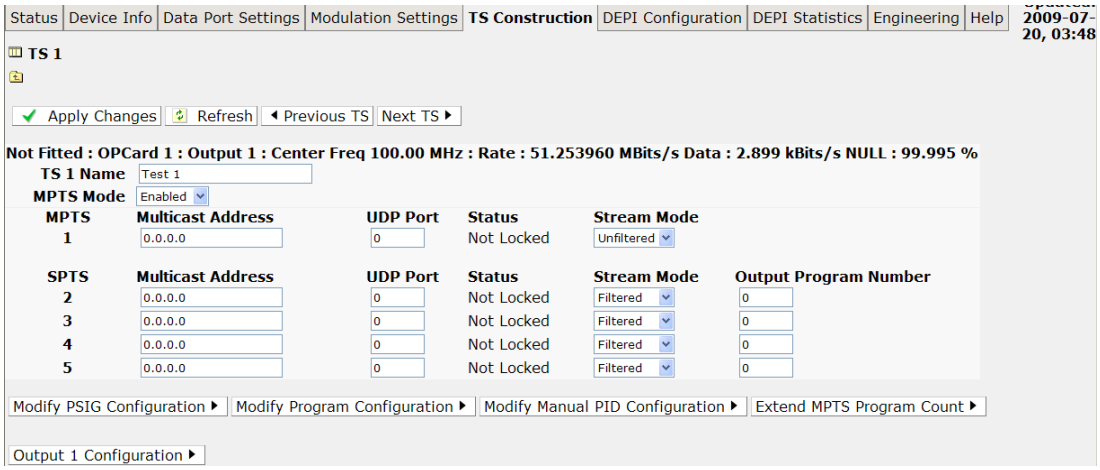


Figure 3.25 Transport Stream (Broadcast) Component Set up

3.4.4.1 Modify Program Count

By default, each of the 96 Output Transport Streams supports the inclusion of up to 32 services. For denser Transport Streams, it is possible to allocate up to 64 services by entering the Modify Program Count page.

When in Broadcast/MPTS mode, selecting Extended mode increases the maximum number of supported services to 64. When not operating in Extended mode, the maximum number of supported services is 32.

Notes: The maximum number of MPTSs that can be configured in Extended mode is 64.

When configuring an MPTS into Extended mode, 32 services are automatically used from the pool of 4096.

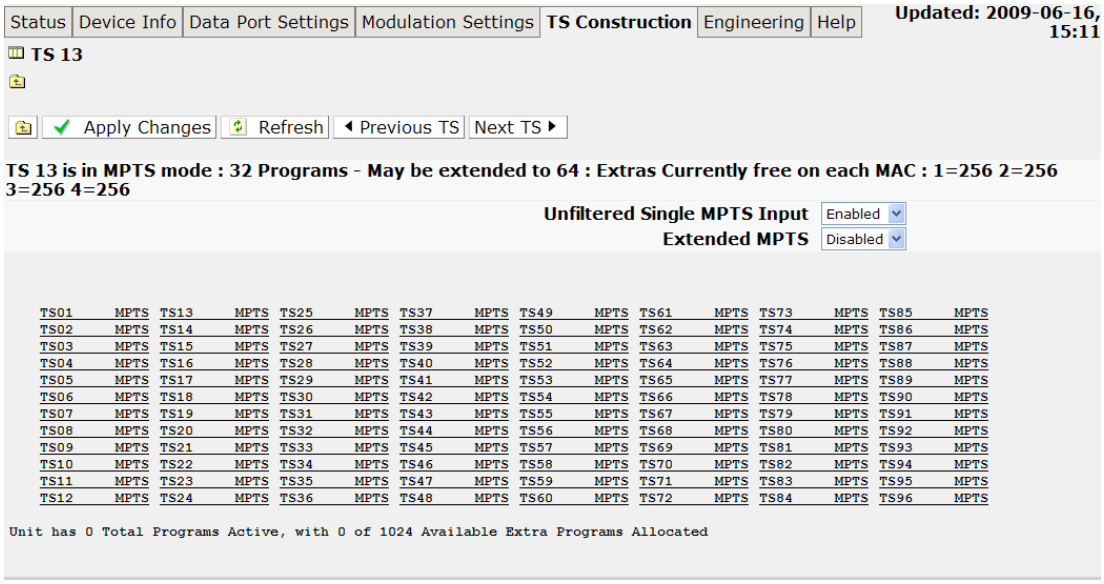

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-16, 15:11
TS 13
Apply Changes
Refresh
Previous TS
Next TS
TS 13 is in MPTS mode : 32 Programs - May be extended to 64 : Extras Currently free on each MAC : 1=256 2=256 3=256 4=256
Unfiltered Single MPTS Input
Enabled
Extended MPTS
Disabled
TS01 MPTS TS13 MPTS TS25 MPTS TS37 MPTS TS49 MPTS TS61 MPTS TS73 MPTS TS85 MPTS
TS02 MPTS TS14 MPTS TS26 MPTS TS38 MPTS TS50 MPTS TS62 MPTS TS74 MPTS TS86 MPTS
TS03 MPTS TS15 MPTS TS27 MPTS TS39 MPTS TS51 MPTS TS63 MPTS TS75 MPTS TS87 MPTS
TS04 MPTS TS16 MPTS TS28 MPTS TS40 MPTS TS52 MPTS TS64 MPTS TS76 MPTS TS88 MPTS
TS05 MPTS TS17 MPTS TS29 MPTS TS41 MPTS TS53 MPTS TS65 MPTS TS77 MPTS TS89 MPTS
TS06 MPTS TS18 MPTS TS30 MPTS TS42 MPTS TS54 MPTS TS66 MPTS TS78 MPTS TS90 MPTS
TS07 MPTS TS19 MPTS TS31 MPTS TS43 MPTS TS55 MPTS TS67 MPTS TS79 MPTS TS91 MPTS
TS08 MPTS TS20 MPTS TS32 MPTS TS44 MPTS TS56 MPTS TS68 MPTS TS80 MPTS TS92 MPTS
TS09 MPTS TS21 MPTS TS33 MPTS TS45 MPTS TS57 MPTS TS69 MPTS TS81 MPTS TS93 MPTS
TS10 MPTS TS22 MPTS TS34 MPTS TS46 MPTS TS58 MPTS TS70 MPTS TS82 MPTS TS94 MPTS
TS11 MPTS TS23 MPTS TS35 MPTS TS47 MPTS TS59 MPTS TS71 MPTS TS83 MPTS TS95 MPTS
TS12 MPTS TS24 MPTS TS36 MPTS TS48 MPTS TS60 MPTS TS72 MPTS TS84 MPTS TS96 MPTS
Unit has 0 Total Programs Active, with 0 of 1024 Available Extra Programs Allocated

Figure 3.26 Modify Program Count Page

3.4.4.2 Modify Program Configuration

Services within an Input MPTS can be filtered in order to include or exclude from the Output Transport Stream. PSI will be generated accordingly by the EQ8096. The page lists the services referenced in the input PSI. To populate all services, use the 'Populate with PAT Services' button. Programs can be added manually using the matrix or by entering within the 'Program Number Ranges' field.

Any programs which are found within the Input MPTS will appear as green.

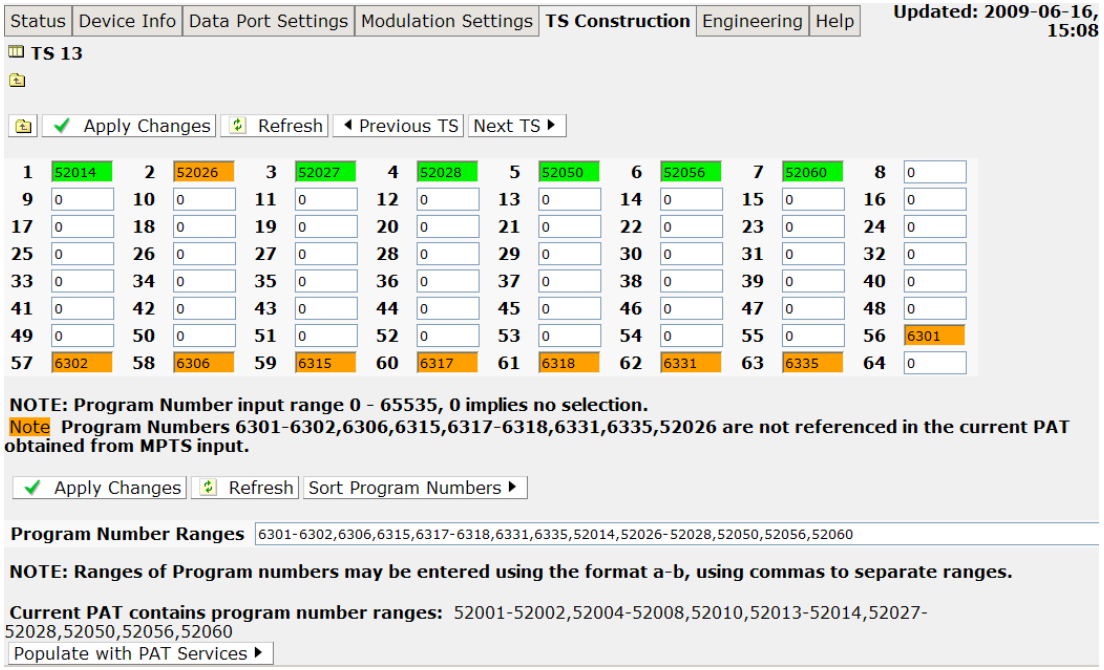

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-16, 15:08
TS 13
Apply Changes
Refresh
Previous TS
Next TS
1 52014 2 52026 3 52027 4 52028 5 52050 6 52056 7 52060 8 0
9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0
17 0 18 0 19 0 20 0 21 0 22 0 23 0 24 0
25 0 26 0 27 0 28 0 29 0 30 0 31 0 32 0
33 0 34 0 35 0 36 0 37 0 38 0 39 0 40 0
41 0 42 0 43 0 44 0 45 0 46 0 47 0 48 0
49 0 50 0 51 0 52 0 53 0 54 0 55 0 56 6301
57 6302 58 6306 59 6315 60 6317 61 6318 62 6331 63 6335 64 0
NOTE: Program Number input range 0 - 65535, 0 implies no selection.
Note Program Numbers 6301-6302,6306,6315,6317-6318,6331,6335,52026 are not referenced in the current PAT obtained from MPTS input.
Apply Changes
Refresh
Sort Program Numbers
Program Number Ranges
6301-6302,6306,6315,6317-6318,6331,6335,52014,52026-52028,52050,52056,52060
NOTE: Ranges of Program numbers may be entered using the format a-b, using commas to separate ranges.
Current PAT contains program number ranges: 52001-52002,52004-52008,52010,52013-52014,52027-52028,52050,52056,52060
Populate with PAT Services

Figure 3.27 Modify Program Configuration Page

3.4.4.3 Modify Manual PID Configuration (Filtered mode only)

PIDs can be explicitly filtered or remapped for the MPTS and the 4 additional SPTSs.

PIDs that are not referenced within the Input MPTS PSI can be passed through (and remapped if desired) by adding the PID value to the Input PID field. The desired PID value applied to the Output Transport Stream should be added to the Output PID field.

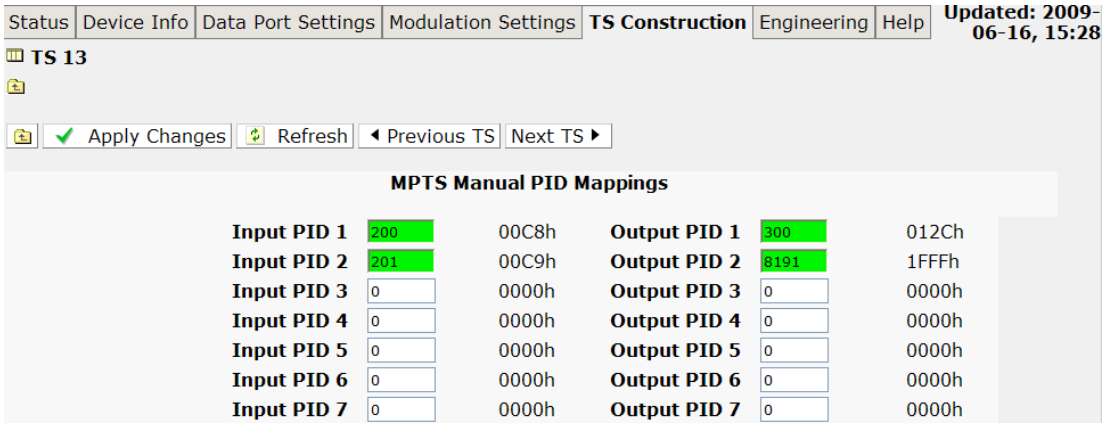

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Updated: 2009-06-16, 15:28
TS 13
Apply Changes
Refresh
Previous TS
Next TS
MPTS Manual PID Mappings
Input PID 1 200 00C8h Output PID 1 300 012Ch
Input PID 2 201 00C9h Output PID 2 8191 1FFFh
Input PID 3 0 0000h Output PID 3 0 0000h
Input PID 4 0 0000h Output PID 4 0 0000h
Input PID 5 0 0000h Output PID 5 0 0000h
Input PID 6 0 0000h Output PID 6 0 0000h
Input PID 7 0 0000h Output PID 7 0 0000h

Figure 3.28 MPTS Manual PID Mappings

The 4 SPTS also allow explicit PID filtering and remapping. The source field is used to specify which of the 4 SPTS the particular map corresponds to (2 to 5, 1 being the MPTS).

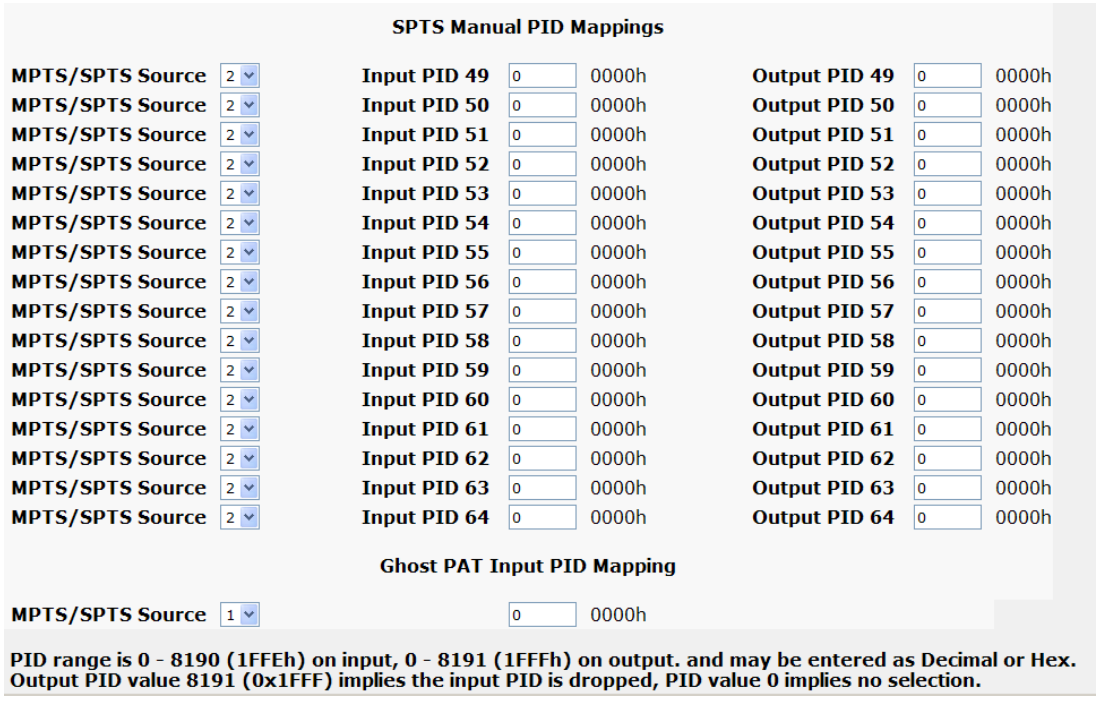

SPTS Manual PID Mappings
MPTS/SPTS Source 2 Input PID 49 0 0000h Output PID 49 0 0000h
MPTS/SPTS Source 2 Input PID 50 0 0000h Output PID 50 0 0000h
MPTS/SPTS Source 2 Input PID 51 0 0000h Output PID 51 0 0000h
MPTS/SPTS Source 2 Input PID 52 0 0000h Output PID 52 0 0000h
MPTS/SPTS Source 2 Input PID 53 0 0000h Output PID 53 0 0000h
MPTS/SPTS Source 2 Input PID 54 0 0000h Output PID 54 0 0000h
MPTS/SPTS Source 2 Input PID 55 0 0000h Output PID 55 0 0000h
MPTS/SPTS Source 2 Input PID 56 0 0000h Output PID 56 0 0000h
MPTS/SPTS Source 2 Input PID 57 0 0000h Output PID 57 0 0000h
MPTS/SPTS Source 2 Input PID 58 0 0000h Output PID 58 0 0000h
MPTS/SPTS Source 2 Input PID 59 0 0000h Output PID 59 0 0000h
MPTS/SPTS Source 2 Input PID 60 0 0000h Output PID 60 0 0000h
MPTS/SPTS Source 2 Input PID 61 0 0000h Output PID 61 0 0000h
MPTS/SPTS Source 2 Input PID 62 0 0000h Output PID 62 0 0000h
MPTS/SPTS Source 2 Input PID 63 0 0000h Output PID 63 0 0000h
MPTS/SPTS Source 2 Input PID 64 0 0000h Output PID 64 0 0000h
Ghost PAT Input PID Mapping
MPTS/SPTS Source 1 0 0000h
PID range is 0 - 8190 (1FFEh) on input, 0 - 8191 (1FFFh) on output. and may be entered as Decimal or Hex.
Output PID value 8191 (0x1FFF) implies the input PID is dropped, PID value 0 implies no selection.

Figure 3.29 SPTS Manual PID Mappings

When an input stream (either the MPTS or any of the 4 SPTS) contains a PAT which is mapped on a Ghost PID (non-zero) then this PID can be specified under ‘Ghost PAT Input PID Mapping’.

The source stream can be specified (1 to 5).

Note: The Output PID value can be the same as the Input PID value – the PID will be passed through. Using an Output PID value of 0x1FFF (8191) will result in the PID being DROPPED from the Output PID value of zero (0) is default and has no effect.

3.4.4.4 Remapping Any PID Within a Replicated Stream (Global SI)

Global SI is the ability to remap any PID within a replicated stream. It is available in both broadcast (MPTS) and VoD (SPTS). The configuration of the device for two separate use-cases are described below.

Note: In both MPTS and SPTS Modes, the user is expected to be aware of what PIDs are available for remapping.

3.4.4.4.1 MPTS

In MPTS mode any of 4 SPTSs can be used for Global SI with the ability to remap up to 16 possible PIDs.

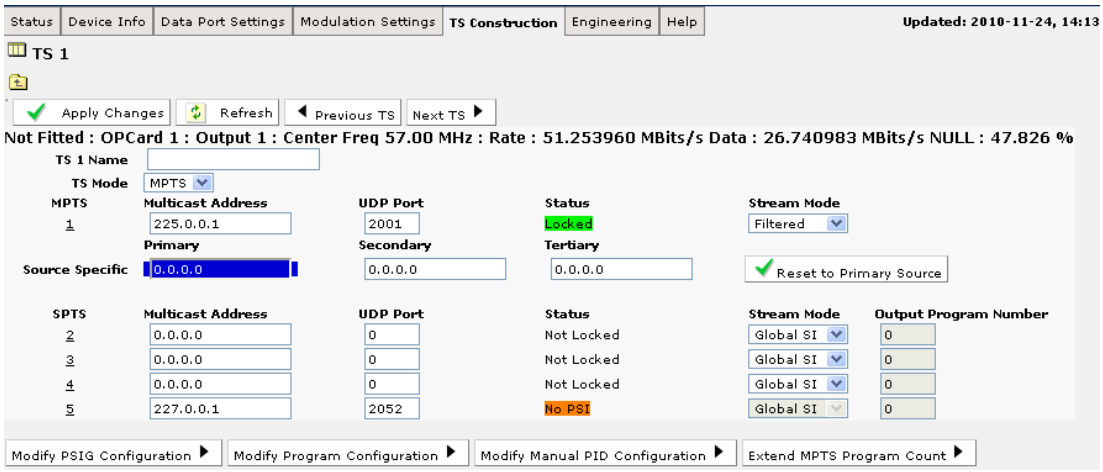


Figure 3.30 Setting up of an MPTS on TS1

Figure 3.30 shows the setting up of an MPTS on TS1 under TS Construction tab. SPTS 5 contains the PIDs to be remapped and the Stream mode is set to filtered.

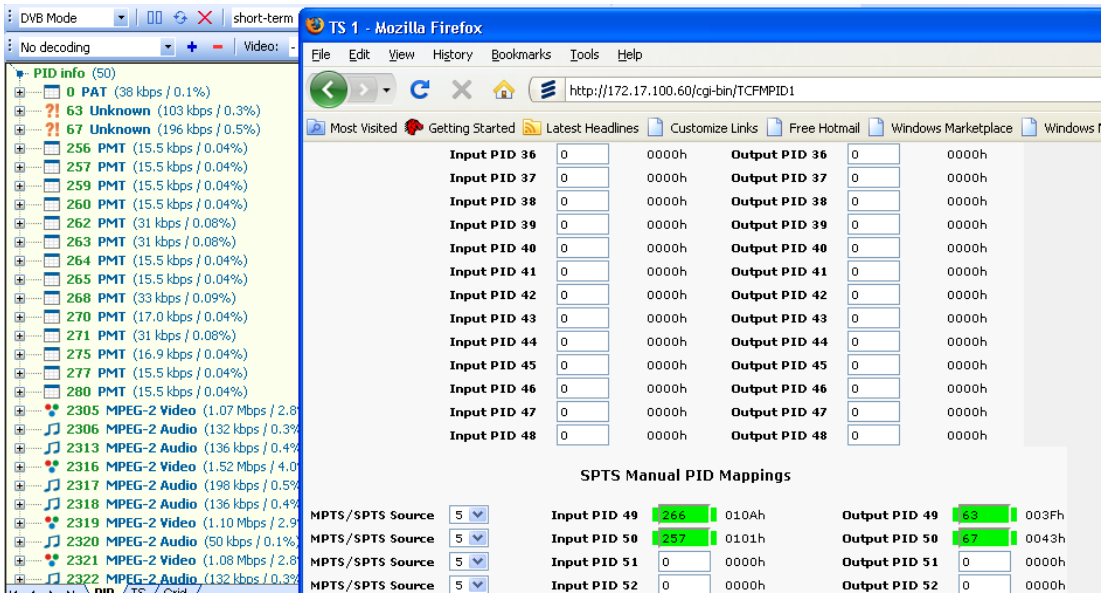

DVB Mode
short-term
No decoding
Video:
PID info (50)
0 PAT (38 kbps / 0.1%)
63 Unknown (103 kbps / 0.3%)
67 Unknown (196 kbps / 0.5%)
256 PMT (15.5 kbps / 0.04%)
257 PMT (15.5 kbps / 0.04%)
259 PMT (15.5 kbps / 0.04%)
260 PMT (15.5 kbps / 0.04%)
262 PMT (31 kbps / 0.08%)
263 PMT (31 kbps / 0.08%)
264 PMT (15.5 kbps / 0.04%)
265 PMT (15.5 kbps / 0.04%)
268 PMT (33 kbps / 0.09%)
270 PMT (17.0 kbps / 0.04%)
271 PMT (31 kbps / 0.08%)
275 PMT (16.9 kbps / 0.04%)
277 PMT (15.5 kbps / 0.04%)
280 PMT (15.5 kbps / 0.04%)
2305 MPEG-2 Video (1.07 Mbps / 2.8
2306 MPEG-2 Audio (132 kbps / 0.3%
2313 MPEG-2 Audio (136 kbps / 0.4%
2316 MPEG-2 Video (1.52 Mbps / 4.0
2317 MPEG-2 Audio (198 kbps / 0.5%
2318 MPEG-2 Audio (136 kbps / 0.4%
2319 MPEG-2 Video (1.10 Mbps / 2.9
2320 MPEG-2 Audio (50 kbps / 0.1%)
2321 MPEG-2 Video (1.08 Mbps / 2.8
2322 MPEG-2 Audio (132 kbps / 0.3%
TS 1 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://172.17.100.60/cgi-bin/TCFMPID1
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace
Input PID 36 0 0000h Output PID 36 0 0000h
Input PID 37 0 0000h Output PID 37 0 0000h
Input PID 38 0 0000h Output PID 38 0 0000h
Input PID 39 0 0000h Output PID 39 0 0000h
Input PID 40 0 0000h Output PID 40 0 0000h
Input PID 41 0 0000h Output PID 41 0 0000h
Input PID 42 0 0000h Output PID 42 0 0000h
Input PID 43 0 0000h Output PID 43 0 0000h
Input PID 44 0 0000h Output PID 44 0 0000h
Input PID 45 0 0000h Output PID 45 0 0000h
Input PID 46 0 0000h Output PID 46 0 0000h
Input PID 47 0 0000h Output PID 47 0 0000h
Input PID 48 0 0000h Output PID 48 0 0000h
SPTS Manual PID Mappings
MPTS/SPTS Source 5 Input PID 49 266 010Ah Output PID 49 63 003Fh
MPTS/SPTS Source 5 Input PID 50 257 0101h Output PID 50 67 0043h
MPTS/SPTS Source 5 Input PID 51 0 0000h Output PID 51 0 0000h
MPTS/SPTS Source 5 Input PID 52 0 0000h Output PID 52 0 0000h

Figure 3.31 PID Remapping to TS1 (MPTS Mode)

On the left of *Figure 3.31* is the part of the Stream Xpert GUI which shows the remapped PIDs. Two of the PIDs contained in SPTS 5 are 266 and 257 these have been successfully mapped onto TS1 as PID 63 and 67.

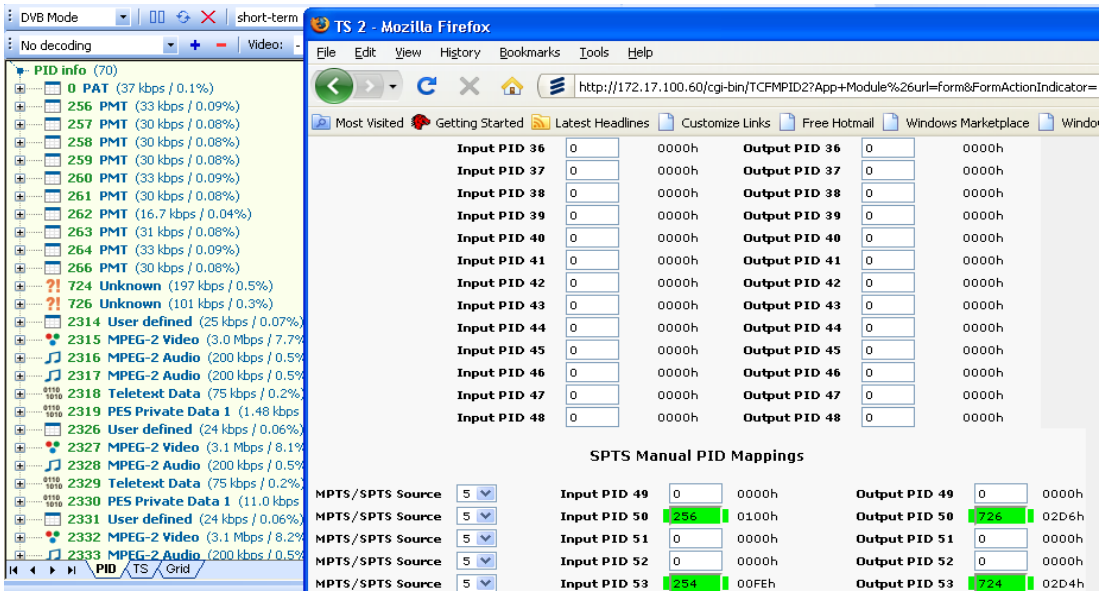

DVB Mode
short-term
No decoding
Video:
PID info (70)
0 PAT (37 kbps / 0.1%)
256 PMT (33 kbps / 0.09%)
257 PMT (30 kbps / 0.08%)
258 PMT (30 kbps / 0.08%)
259 PMT (30 kbps / 0.08%)
260 PMT (33 kbps / 0.09%)
261 PMT (30 kbps / 0.08%)
262 PMT (16.7 kbps / 0.04%)
263 PMT (31 kbps / 0.08%)
264 PMT (33 kbps / 0.09%)
266 PMT (30 kbps / 0.08%)
724 Unknown (197 kbps / 0.5%)
726 Unknown (101 kbps / 0.3%)
2314 User defined (25 kbps / 0.07%)
2315 MPEG-2 Video (3.0 Mbps / 7.7%
2316 MPEG-2 Audio (200 kbps / 0.5%
2317 MPEG-2 Audio (200 kbps / 0.5%
2318 Teletext Data (75 kbps / 0.2%)
2319 PES Private Data 1 (1.48 kbps
2326 User defined (24 kbps / 0.06%)
2327 MPEG-2 Video (3.1 Mbps / 8.1%
2328 MPEG-2 Audio (200 kbps / 0.5%
2329 Teletext Data (75 kbps / 0.2%)
2330 PES Private Data 1 (11.0 kbps
2331 User defined (24 kbps / 0.06%)
2332 MPEG-2 Video (3.1 Mbps / 8.2%
2333 MPEG-2 Audio (200 kbps / 0.5%
PID TS Grid
TS 2 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://172.17.100.60/cgi-bin/TCFMPID2?App+Module%26url=form&FormActionIndicator=
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace
Input PID 36 0 0000h Output PID 36 0 0000h
Input PID 37 0 0000h Output PID 37 0 0000h
Input PID 38 0 0000h Output PID 38 0 0000h
Input PID 39 0 0000h Output PID 39 0 0000h
Input PID 40 0 0000h Output PID 40 0 0000h
Input PID 41 0 0000h Output PID 41 0 0000h
Input PID 42 0 0000h Output PID 42 0 0000h
Input PID 43 0 0000h Output PID 43 0 0000h
Input PID 44 0 0000h Output PID 44 0 0000h
Input PID 45 0 0000h Output PID 45 0 0000h
Input PID 46 0 0000h Output PID 46 0 0000h
Input PID 47 0 0000h Output PID 47 0 0000h
Input PID 48 0 0000h Output PID 48 0 0000h
SPTS Manual PID Mappings
MPTS/SPTS Source 5 Input PID 49 0 0000h Output PID 49 0 0000h
MPTS/SPTS Source 5 Input PID 50 256 0100h Output PID 50 726 02D6h
MPTS/SPTS Source 5 Input PID 51 0 0000h Output PID 51 0 0000h
MPTS/SPTS Source 5 Input PID 52 0 0000h Output PID 52 0 0000h
MPTS/SPTS Source 5 Input PID 53 254 00FEh Output PID 53 724 02D4h

Figure 3.32 PID Remapping to TS2 (MPTS Mode)

Figure 3.32 is a repeat of *Figure 3.31*, but for TS2 instead of TS1. Two different PIDs are now being remapped onto the Transport Stream.

3.4.4.4.2 SPTS

For SPTS, the last service slot shall always allow the user to remap up to 14 PIDs. For standard mode this will be program 32 and for extended mode this will be program 48 or 64. Any PID which is not referenced shall be discarded for that Transport Stream.

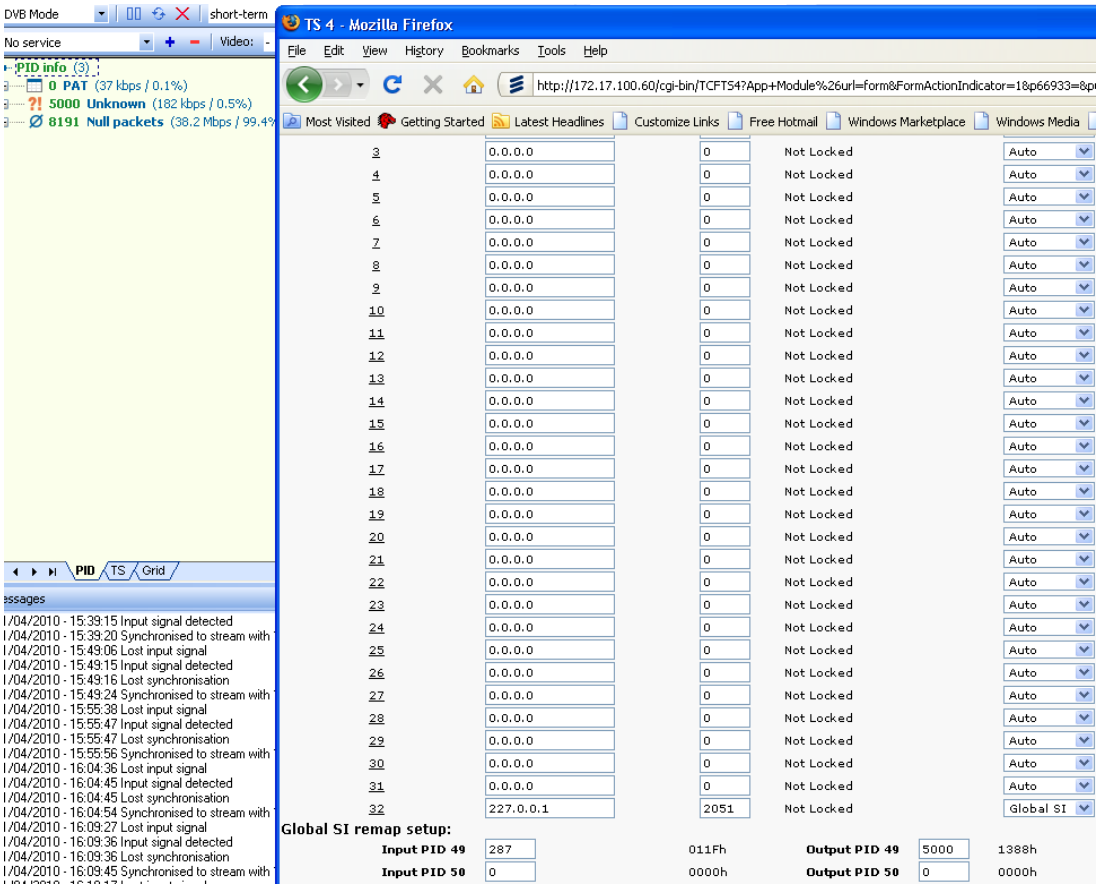

DVB Mode
short-term
No service
Video:
PID info (3)
0 PAT (37 kbps / 0.1%)
5000 Unknown (182 kbps / 0.5%)
8191 Null packets (38.2 Mbps / 99.4%
PID
TS
Grid
ssages
TS 4 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://172.17.100.60/cgi-bin/TCFTS4?App+Module%26url=form&FormActionIndicator=1&p66933=&p
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace Windows Media
Global SI remap setup:
Input PID 49 287 011Fh Output PID 49 5000 1388h
Input PID 50 0 0000h Output PID 50 0 0000h

Figure 3.33 PID Remapping (SPTS Mode)

In SPTS mode the Stream Mode must be set to Filtered. In *Figure 3.33* PID 287 has been remapped to PID 5000.

3.4.4.5 Modify PSIG Configuration

PAT and PMT tables can be blocked, passed through or generated to cater for any customer specific remultiplexing requirements. Any PID remaps are reflected in the generated PSI but this can be disabled for advanced situations.

'Ghost PAT PID' is the input PID value containing the 'Ghost PAT'. This will be remapped to zero (0). The source of this Ghost PAT can be either the MPTS (1) or any of the 4 SPTS (2-5).

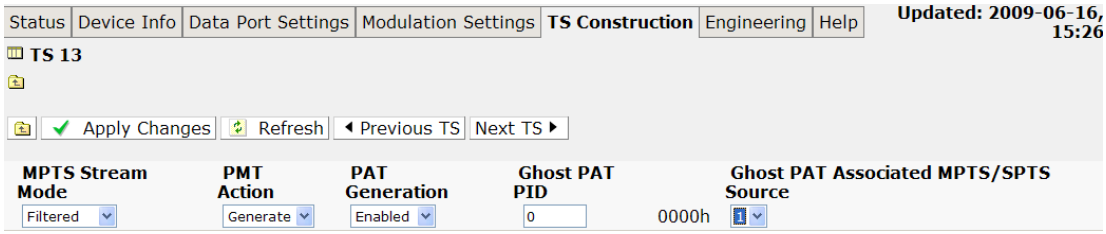


Figure 3.34 Modify PSIG Configuration

3.4.5 DEPI/M-CMTS Mode

3.4.5.1 Overview

When the EQ8096/HWO/DTI and EQ8096/SWO/DTI are installed and licensed, the unit can then support DOCSIS 3.0 DEPI traffic over its Input interfaces.

The unit will automatically switch between DEPI MPT and DEPI PSP mode. The unit also allows any DEPI data flow to co-exist with VoD, Broadcast or SDV configured TS.

Note: Please refer to *Chapter 10* for setup within an M-CMTS installation.

3.5 Conditional Access Tabbed Page

3.5.1 Overview

The Conditional Access tabbed page allows the Conditional Access settings to be accessed. The following sections describe those pages appropriate to the operation of the unit.

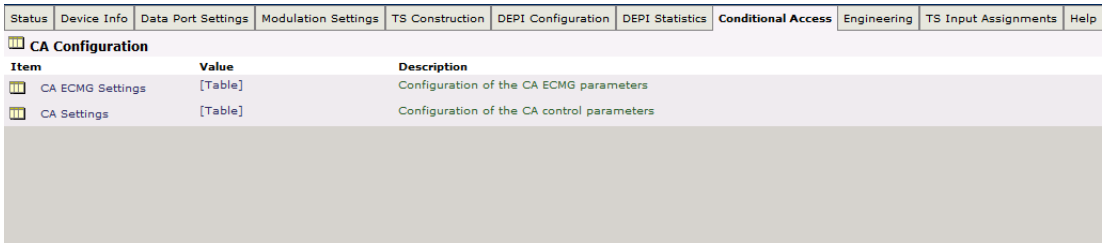


Figure 3.35 Conditional Access Tabbed Web Page

This web page provides access to two further pages for the configuration of CA parameters: **CA ECMG Settings** and **CA Settings**.

3.5.2 CA ECMG Settings

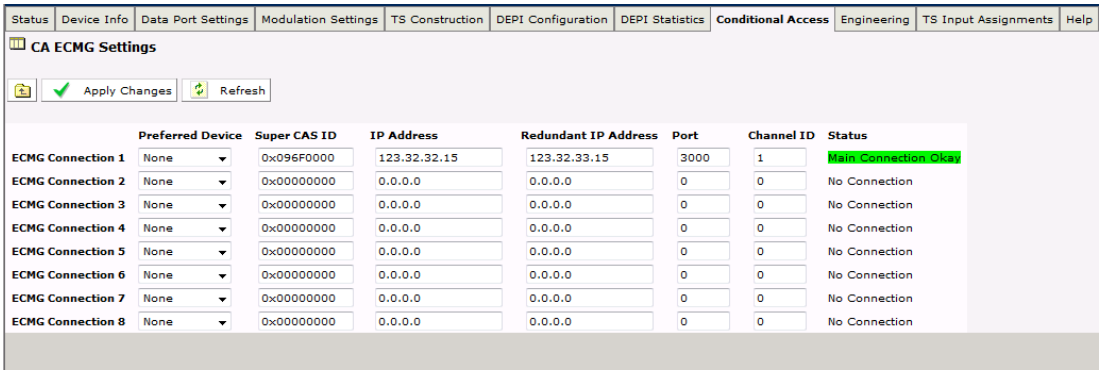

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
DEPI Configuration
DEPI Statistics
Conditional Access
Engineering
TS Input Assignments
Help
CA ECMG Settings
Apply Changes
Refresh
Preferred Device
Super CAS ID
IP Address
Redundant IP Address
Port
Channel ID
Status
ECMG Connection 1 None 0x096F0000 123.32.32.15 123.32.33.15 3000 1 Main Connection Okay
ECMG Connection 2 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 3 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 4 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 5 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 6 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 7 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection
ECMG Connection 8 None 0x00000000 0.0.0.0 0.0.0.0 0 0 No Connection

Figure 3.36 CA ECMG Settings Web Page

Selecting **CA ECMG Settings** enables the settings for up to 8 ECMG connections to be defined:

- **Preferred Device** – Three options are available via the drop-down menu:
  - **None** – selects the first available ECMG.
  - **Main** – selects the Main ECMG as the preferred device.
  - **Redundant** – selects the Redundant ECMG as the preferred device.
- **SuperCAS ID** – supplied by the ECMG vendor.
- **IP Address** – address for the main ECMG.
- **Redundant IP Address** – address for a redundant ECMG connection.
- **Port** – the port number on which the ECMG will connect.
- **Channel ID** – a channel identifier number.
- **Status** – Provides information regarding connection status of the ECMG, i.e. whether the main or redundant is working or whether there is no connection.

3.5.3 CA Settings

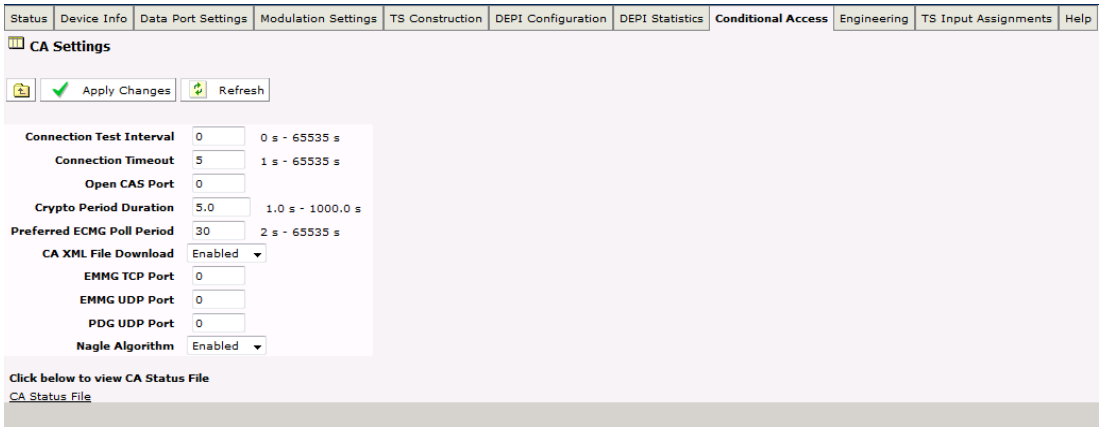


Figure 3.37 CA Settings Web Page

Selecting **CA Settings** enables settings to be defined for:

- **Connection Test Interval** – keep alive traffic test interval between EQ8096 and OpenCAS server or EIS.
- **Connection Timeout** – the wait time before an OpenCAS alarm is raised.
- **Open CAS Port**
- **Crypto Period Duration** – proposed key change interval.
- **Preferred ECMG Poll Period** – same as above between ECMG and EQ8096.
- **CA XML File Download** – enables/disables CA configuration file download on the EQ8096. Default is enabled.
- **EMMG TCP Port** – allows TCP port number to be defined for EMMG. If this is defined, EMMG UDP port is not defined.
- **EMMG UDP Port** – allows UDP port number to be defined for EMMG. If this is defined, EMMG TCP port is not defined.
- **PDG UDP Port** – port number for connection via Private Data Group.
- **Nagle Algorithm** – enables/disables Nagle Algorithm for combining smaller status messages into one larger message.

This tab also allows for the extraction of the CA Status File from the EQ8096.

3.6 Engineering Tabbed Page

3.6.1 Overview

The Engineering tabbed page allows various non-operational information to be accessed. The following sections describe those pages appropriate to the operation of the unit.

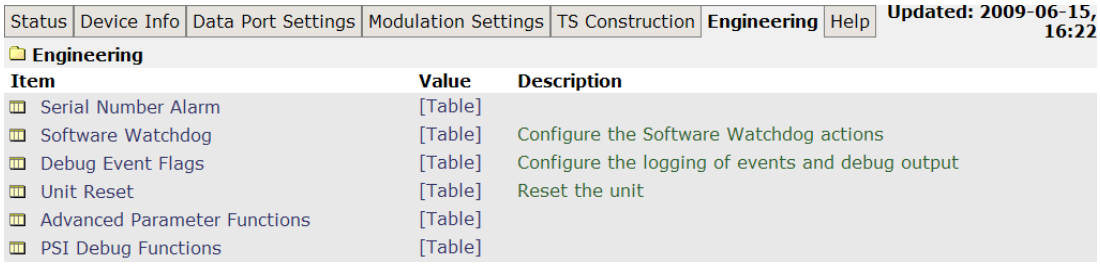


Figure 3.38 Engineering Tabbed Web Page

3.6.1.1 Software Watchdog

The EQ8096 provides watchdog functionality that permits a full hardware reset on a timeout. The watchdog is enabled and controlled by the EQ8096 software.

It is possible to override the watchdog software control by disabling it in the **Software Watchdog Reset** . The Watchdog alarm is masked on the same page.

3.6.1.2 Debug Event Flags

This page provides settings to obtain diagnostic information on internal unexpected conditions.

These flags are used by Ericsson personnel for investigating abnormal system circumstances.

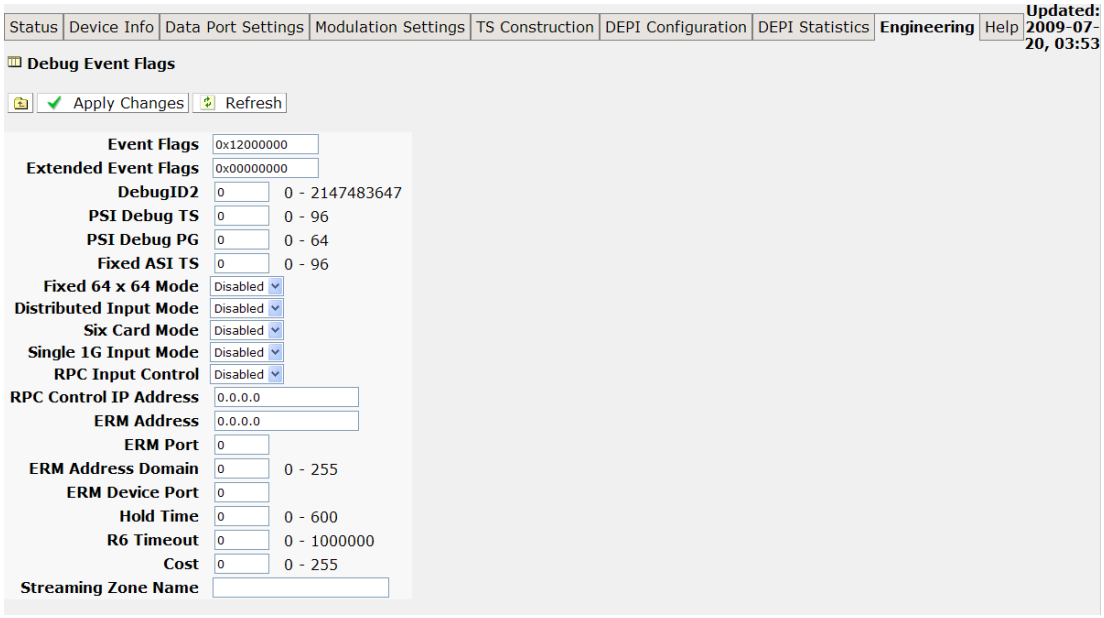


Figure 3.39 Debug Event Flags Web Page

3.6.1.3 SDV controls

The EQ8096 permits the unit to be used within a Switched Digital Video environment, using RPC system protocol.

3.6.1.4 Unit Reset

When the EQ8096 unit is reset, the last saved parameters are used to define the power up state.

3.6.1.5 Advanced Parameter Functions

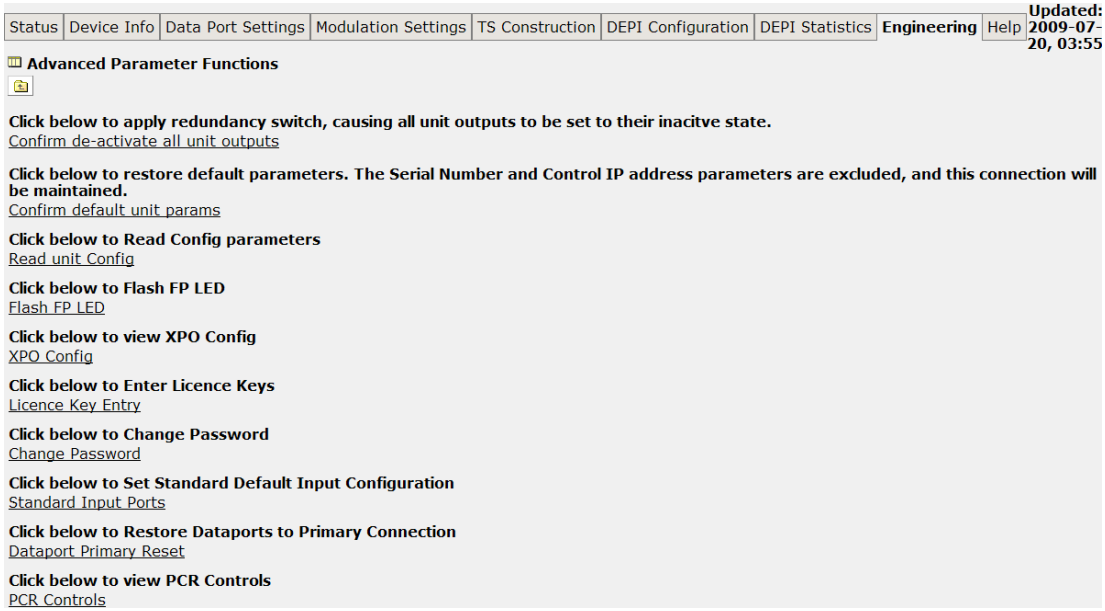

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
DEPI Configuration
DEPI Statistics
Engineering
Help
Updated: 2009-07-20, 03:55
Advanced Parameter Functions
Click below to apply redundancy switch, causing all unit outputs to be set to their inacitve state.
Confirm de-activate all unit outputs
Click below to restore default parameters. The Serial Number and Control IP address parameters are excluded, and this connection will be maintained.
Confirm default unit params
Click below to Read Config parameters
Read unit Config
Click below to Flash FP LED
Flash FP LED
Click below to view XPO Config
XPO Config
Click below to Enter Licence Keys
Licence Key Entry
Click below to Change Password
Change Password
Click below to Set Standard Default Input Configuration
Standard Input Ports
Click below to Restore Dataports to Primary Connection
Dataport Primary Reset
Click below to view PCR Controls
PCR Controls

Figure 3.40 Advanced Parameter Functions Web Page

- This page provides a means to apply a redundancy switch, causing all unit outputs to be set to their inactive state.
- Default parameters can also be restored (excluding the Serial Number and Control IP address parameters) and the connection will be maintained.
- This page also allows the configuration parameters to be read, the output being a hex file.
- Selecting **Flash FP LED** will cause the unit front panel green LED to flash a few times.
- XPO Config allows the user to retrieve the XPO configuration file.
- License key entry is primarily for factory use only, to enable licensed features such as DVBCA.
- Standard Input Ports auto populates the TS pages with a fixed paradigm UDP port assignment. The IP address/Multicast address used is the same as that defined for the relevant Data Port.
- Data port primary reset forces the data ports back to their primary connection, after a redundancy switch.

3.6.1.6 PSI Debug Functions

The PSI Debug Function is provided for engineering debug of the unit in unexpected circumstances.

3.7 TS Input Assignments Tabbed Page

The TS Input Assignments tabbed page enables navigation to different Transport Stream MAC assignment pages, as well as showing the number of enabled TS and MAC source for each Output Card. By default Output Cards 1 and 2 are sourced by MAC1, and Output Cards 3 and 4 via MAC2 etc.

Transport Stream MAC assignment is configured using the TS Construction page, see *Section 3.4*.

Any-to-any mapping enables the unit to map any Transport Streams on any Input Port to any RF Output Card QAM channel.

Note: The user is expected to keep a record of what MAC input source corresponds to which Program within a Transport Stream.

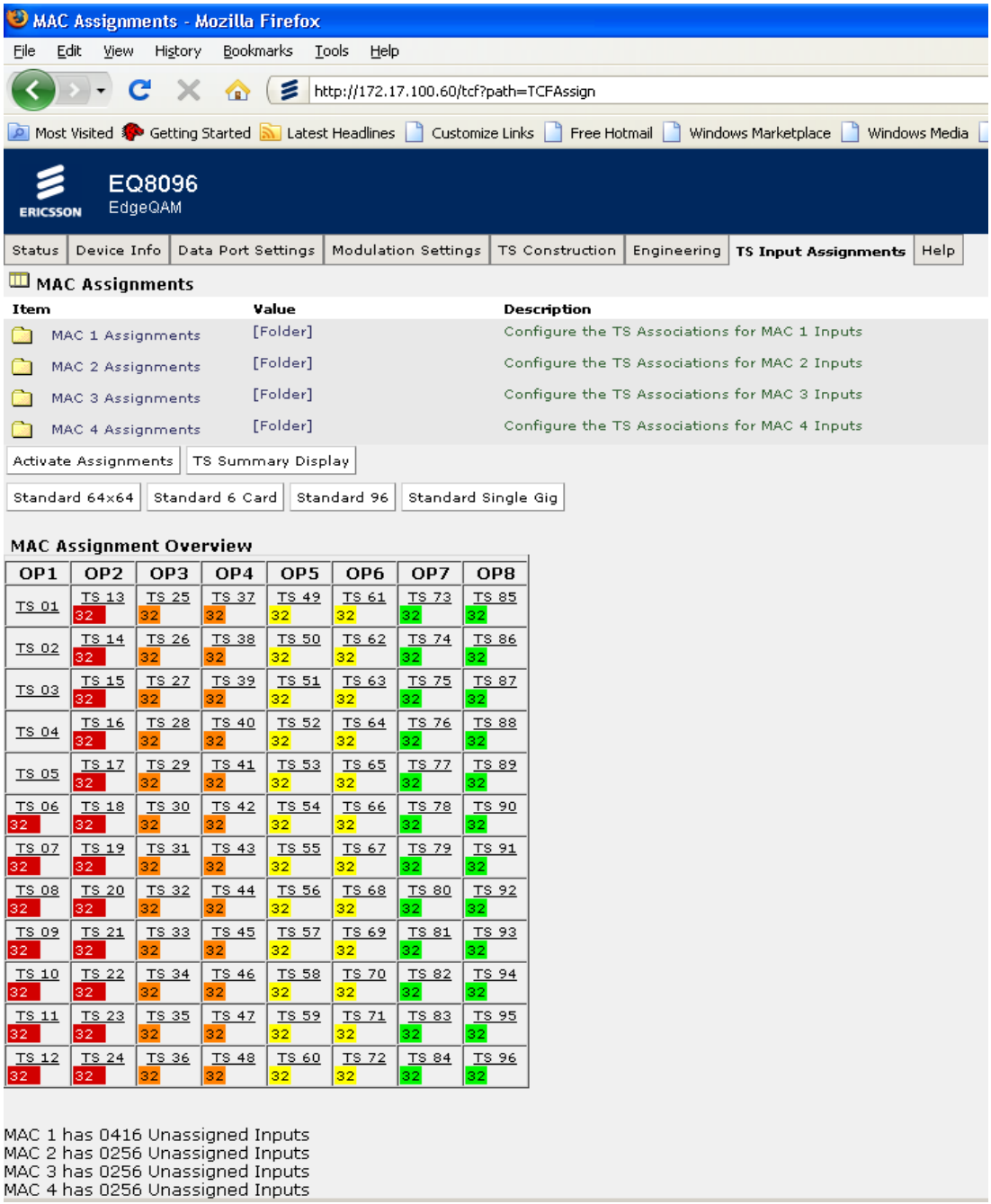

MAC Assignments - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://172.17.100.60/tcf?path=TCFAssign
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace Windows Media
ERICSSON
EQ8096
EdgeQAM
Status Device Info Data Port Settings Modulation Settings TS Construction Engineering TS Input Assignments Help
MAC Assignments
Item Value Description
MAC 1 Assignments [Folder] Configure the TS Associations for MAC 1 Inputs
MAC 2 Assignments [Folder] Configure the TS Associations for MAC 2 Inputs
MAC 3 Assignments [Folder] Configure the TS Associations for MAC 3 Inputs
MAC 4 Assignments [Folder] Configure the TS Associations for MAC 4 Inputs
Activate Assignments TS Summary Display
Standard 64x64 Standard 6 Card Standard 96 Standard Single Gig
MAC Assignment Overview
OP1 OP2 OP3 OP4 OP5 OP6 OP7 OP8
TS 01 TS 13 TS 25 TS 37 TS 49 TS 61 TS 73 TS 85
TS 02 TS 14 TS 26 TS 38 TS 50 TS 62 TS 74 TS 86
TS 03 TS 15 TS 27 TS 39 TS 51 TS 63 TS 75 TS 87
TS 04 TS 16 TS 28 TS 40 TS 52 TS 64 TS 76 TS 88
TS 05 TS 17 TS 29 TS 41 TS 53 TS 65 TS 77 TS 89
TS 06 TS 18 TS 30 TS 42 TS 54 TS 66 TS 78 TS 90
TS 07 TS 19 TS 31 TS 43 TS 55 TS 67 TS 79 TS 91
TS 08 TS 20 TS 32 TS 44 TS 56 TS 68 TS 80 TS 92
TS 09 TS 21 TS 33 TS 45 TS 57 TS 69 TS 81 TS 93
TS 10 TS 22 TS 34 TS 46 TS 58 TS 70 TS 82 TS 94
TS 11 TS 23 TS 35 TS 47 TS 59 TS 71 TS 83 TS 95
TS 12 TS 24 TS 36 TS 48 TS 60 TS 72 TS 84 TS 96
MAC 1 has 0416 Unassigned Inputs
MAC 2 has 0256 Unassigned Inputs
MAC 3 has 0256 Unassigned Inputs
MAC 4 has 0256 Unassigned Inputs

Figure 3.41 TS Input Assignments Web Page

BLANK

Alarms

Chapter 4

Contents

4.1 Introduction 4-3
4.2 View Active Alarm Table 4-4
4.3 Configure Active Alarms 4-4
4.4 Specific Alarms 4-5
4.4.1 Serial Number Alarm 4-5
4.4.2 Data Connection Alarms 4-5
4.4.3 Modulator Alarms 4-5
4.4.4 Transport Streams Alarms 4-6
4.4.5 Temperature Alarms 4-7
4.4.6 PSU Alarms 4-8
4.5 Trap Destination Table 4-8
4.6 Status Indicators 4-9
4.6.1 Location of the Status Indicators 4-9
4.6.2 Indication States 4-9
4.6.3 Ethernet Status Indicator 4-10
4.7 Unit Alarm List 4-10

List of Figures

Figure 4.1 Status Web Page 4-3
Figure 4.2 Alarms Web Page 4-4
Figure 4.3 Active Alarm List Web Page 4-4
Figure 4.4 Serial Number Alarm Web Page 4-5
Figure 4.5 Modulator Card Alarms Web Page 4-6
Figure 4.6 Transport Streams Alarms Web Page 4-6
Figure 4.7 Temperature Alarms Web Page 4-7
Figure 4.8 PSU Alarms Web Page 4-8
Figure 4.9 Trap Destination Table Web Page 4-9
Figure 4.10 Position of the Status Indicators 4-9

List of Tables

Table 4.1 Alarm Source Identification 4-3
Table 4.2 Alarm Identification 4-3
Table 4.3 Alarm Severity Levels 4-4
Table 4.4 Items on the Data Connection Alarms Web Page 4-5

Table 4.5 Status LED States 4-10
Table 4.6 Unit Alarm List 4-10

4.1 Introduction

This chapter describes the alarm aspects of the EQ8096, the functionality of the Status indicator located at the rear panel (see *Section 4.6*) and the use of the SNMP Traps (see *Section 4.4.6*). The EQ8096 supports the reporting of status and alarms via SNMPv1/2 and HTTP protocols.

Note: The unit provides the user with a RED LED on the front panel to indicate an alarm condition. This is lit when the global summary alarm is active.

Each alarm is configurable by all supported control interfaces in terms of:

- Masked / unmasked
- Alarm trigger (i.e. packet count, temperature threshold etc)

When an alarm is generated, the alarm module within the EQ8096 identifies both the alarm and its source. This information is displayed on the Status web page (which is the start-up page) and shows the current status of the unit. Specific information for each device is accessed under Alarms on the Device Info tabbed page (see *Section 4.4*).

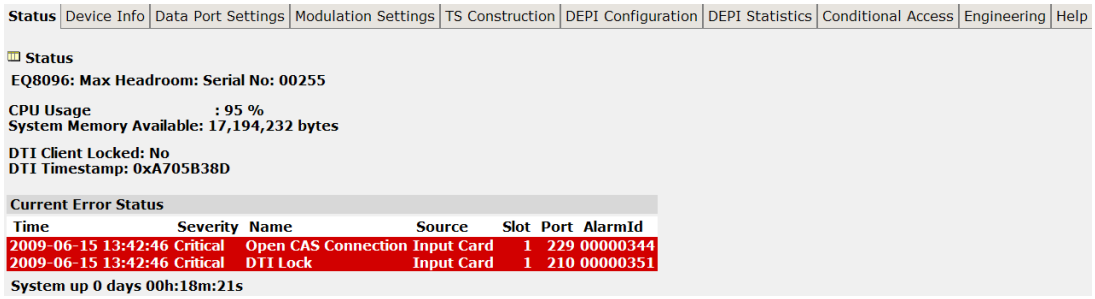


Figure 4.1 Status Web Page

Table 4.1 to *Table 4.3* describe the various fields on the web page.

Table 4.1 Alarm Source Identification

Parameter	Description
Slot (Position)	Identifies the alarm source position in the system. This is typically implemented by the slot number, but can be a pointer to any type location in the unit.
Port	Identifies a specific source within a position.

Table 4.2 Alarm Identification

Parameter	Description
Alarm ID	Unique number within the EQ8096 (see *Section 4.5*).

4.2 View Active Alarm Table

The EQ8096 software provides functionality for handling, logging and displaying application alarms.

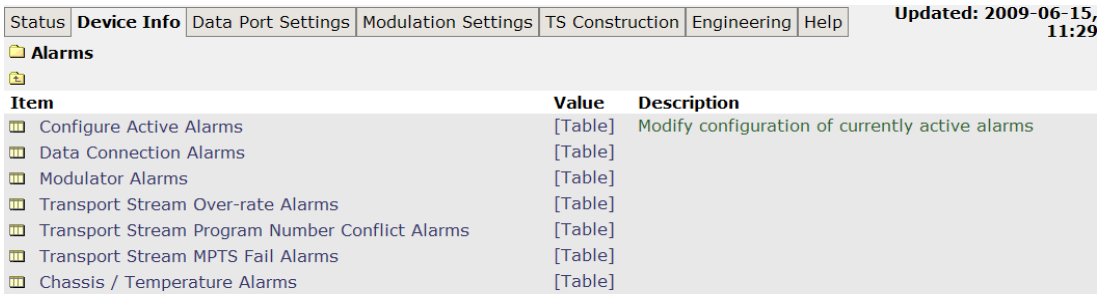


Figure 4.2 Alarms Web Page

The alarm handling includes user-controlled masking (see *Section 4.3*).

4.3 Configure Active Alarms

The EQ8096 software provides the facility to mask any internal alarm.

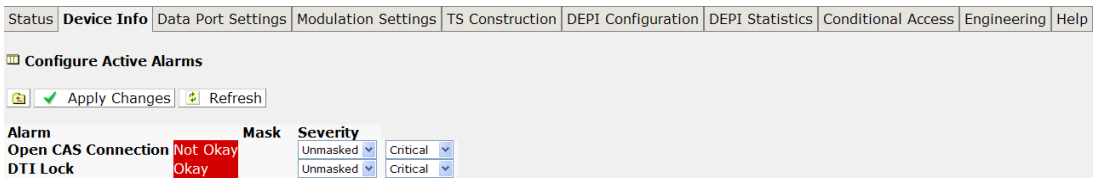


Figure 4.3 Active Alarm List Web Page

There are four levels of severity. These are described in *Table 4.3.*

Table 4.3 Alarm Severity Levels

Severity	Color	Description	Action
Healthy	-	No problems, normal operational condition.	No action.
Warning	Yellow	Problem detected, device still working but may require attention.	Action may be required to diagnose and rectify the fault before it affects the service.
Minor	Light Orange	Problem detected, device may still be working but will require attention.	Action is required to diagnose and rectify the fault before it affects the service.
Major	Dark Orange	Device probably not working.	Urgent corrective action is required. This may occur when there has been a serious degradation of the output.
Critical	Red	Indicates a failure of equipment affecting the service.	Immediate corrective action is required. This may arise when a condition occurs which stops the unit producing a valid output.

4.4 Specific Alarms

4.4.1 Serial Number Alarm

The serial number is unique and set at manufacture. It corresponds with the number printed on the side of the unit to assist in unit identification. It is also used to configure the MAC addresses of the Ethernet ports.

The alarm indicates that the serial number of the unit has not been set or has been reset to 0. In this case the MAC addresses will not be unique (other units with no serial number set will have the same MAC addresses).

The serial number is factory-set.

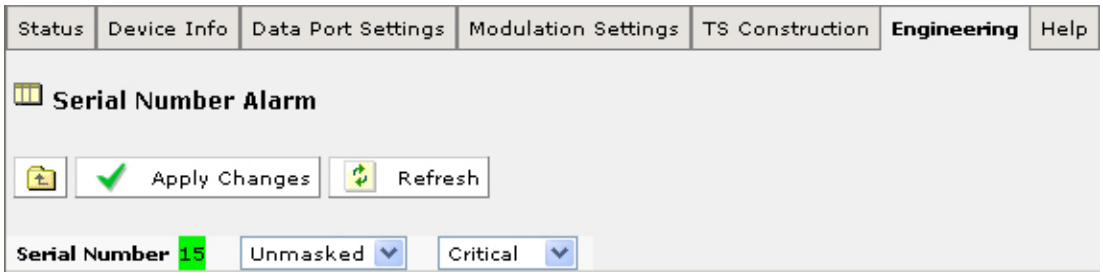


Figure 4.4 Serial Number Alarm Web Page

4.4.2 Data Connection Alarms

An alarm is raised if there is no physical data connection.

Table 4.4 describes the items carried on the Data Connection Alarms web page.

Table 4.4 Items on the Data Connection Alarms Web Page

Parameter	Description
Data Connection	Provides an indication of the line status of the selected data port. A loss of line activity generates a Data connection alarm

4.4.3 Modulator Alarms

This page allows modulator alarms to be masked/unmasked and also allows the level of alarm severity to be selected.

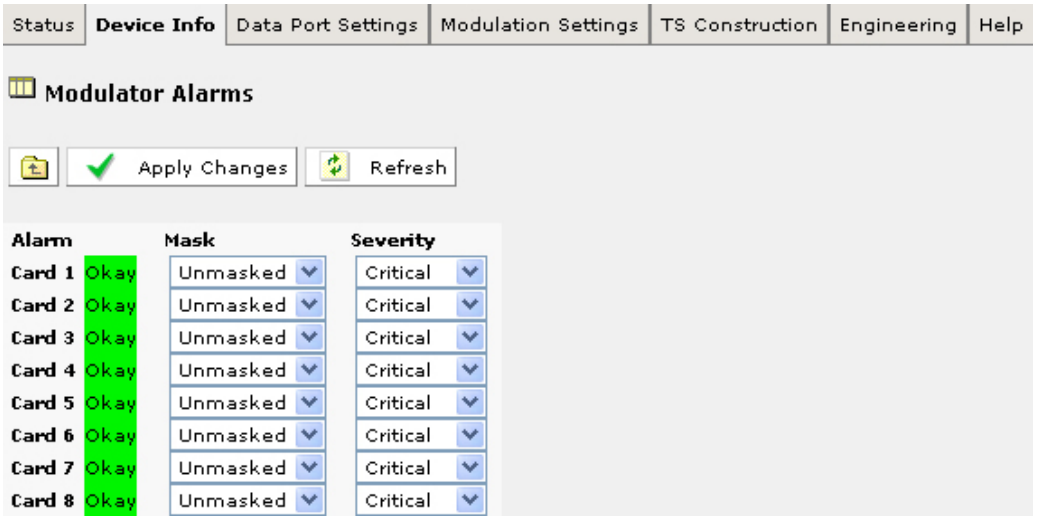


Figure 4.5 Modulator Card Alarms Web Page

4.4.4 Transport Streams Alarms

This page allows the Transport Stream Over-rate alarm to be masked.

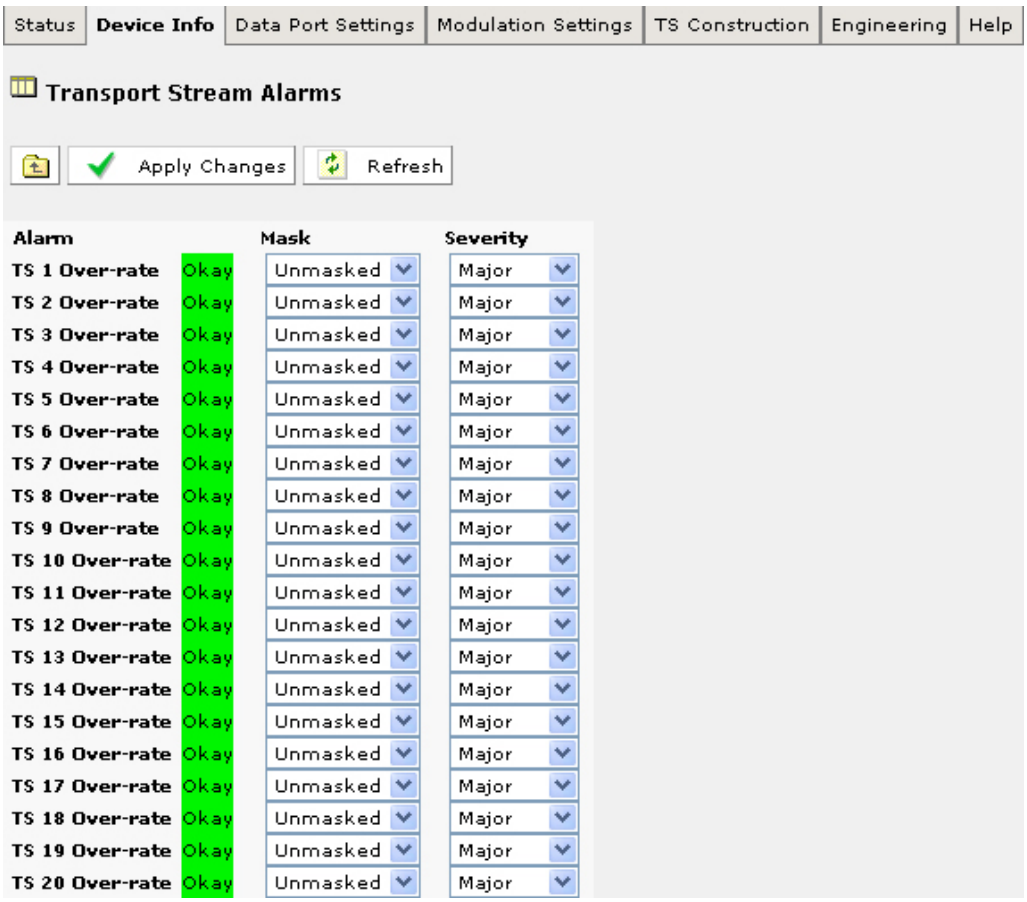

Status
Device Info
Data Port Settings
Modulation Settings
TS Construction
Engineering
Help
Transport Stream Alarms
Apply Changes
Refresh
Alarm
Mask
Severity
TS 1 Over-rate Okay Unmasked Major
TS 2 Over-rate Okay Unmasked Major
TS 3 Over-rate Okay Unmasked Major
TS 4 Over-rate Okay Unmasked Major
TS 5 Over-rate Okay Unmasked Major
TS 6 Over-rate Okay Unmasked Major
TS 7 Over-rate Okay Unmasked Major
TS 8 Over-rate Okay Unmasked Major
TS 9 Over-rate Okay Unmasked Major
TS 10 Over-rate Okay Unmasked Major
TS 11 Over-rate Okay Unmasked Major
TS 12 Over-rate Okay Unmasked Major
TS 13 Over-rate Okay Unmasked Major
TS 14 Over-rate Okay Unmasked Major
TS 15 Over-rate Okay Unmasked Major
TS 16 Over-rate Okay Unmasked Major
TS 17 Over-rate Okay Unmasked Major
TS 18 Over-rate Okay Unmasked Major
TS 19 Over-rate Okay Unmasked Major
TS 20 Over-rate Okay Unmasked Major

Figure 4.6 Transport Streams Alarms Web Page

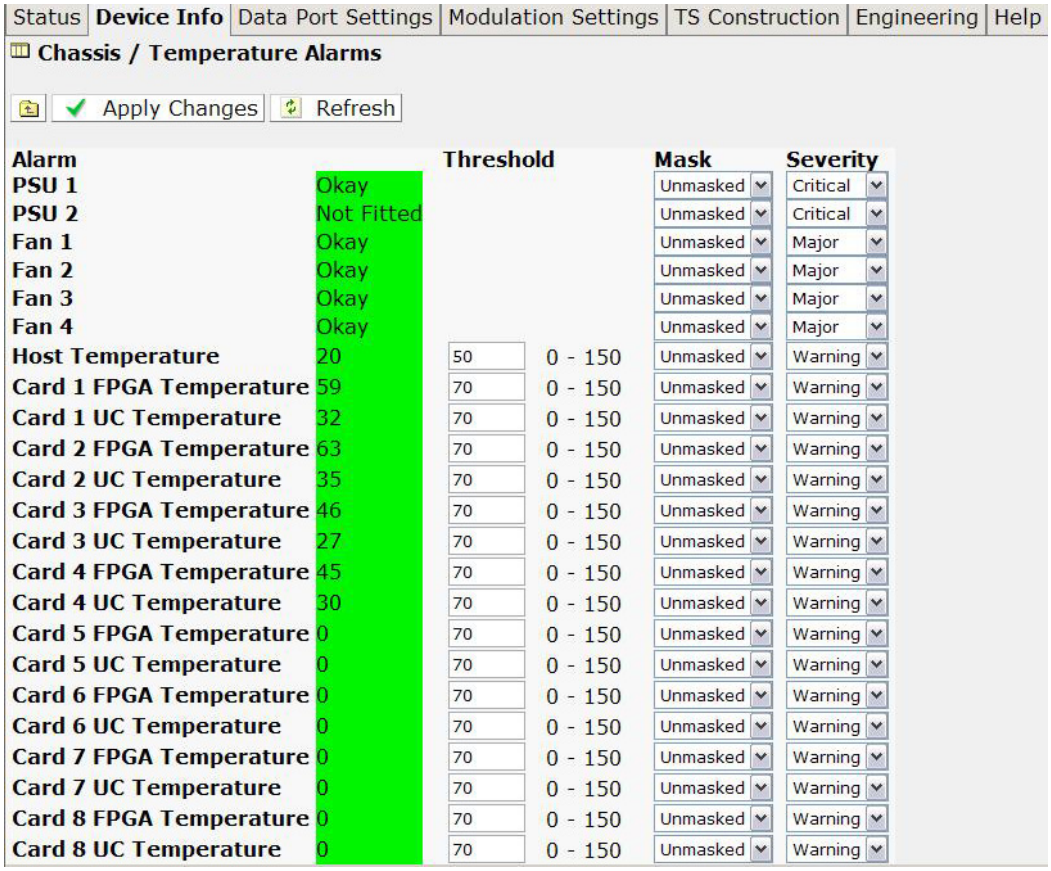
The threshold value is determined by the global modulator settings, as this defines the overall bit rate for each of the generated transport streams. An alarm is raised if the total bit rate of all incoming UDP flows associated with a particular channel exceeds this threshold level.

The status for each incoming transport stream can be seen under the TS Construction Page. The status parameter will be in one of the following states:

- **Not locked**: Indicating that the UDP port is not receiving any data.
- **Locked**: Indicating that the UDP port is receiving data and the card is locked onto a valid transport stream with a valid set of PAT and PMT(s).
- **No PSI**: Indicating that the UDP port is receiving data and the card is locked onto a valid transport stream without a valid set of PAT and PMT(s).

4.4.5 Temperature Alarms

The EQ8096 is forced-air cooled. The unit supports fan failure detection for any of the 4 fans (card and PSU). It also provides internal temperature monitoring which is configured to generate over-temperature alarms if a given threshold level is exceeded. There is a separate temperature monitor on the main data input card and each Modulator assembly.



Alarm		Threshold		Mask	Severity
PSU 1	Okay			Unmasked	Critical
PSU 2	Not Fitted			Unmasked	Critical
Fan 1	Okay			Unmasked	Major
Fan 2	Okay			Unmasked	Major
Fan 3	Okay			Unmasked	Major
Fan 4	Okay			Unmasked	Major
Host Temperature	20	50	0 - 150	Unmasked	Warning
Card 1 FPGA Temperature	59	70	0 - 150	Unmasked	Warning
Card 1 UC Temperature	32	70	0 - 150	Unmasked	Warning
Card 2 FPGA Temperature	63	70	0 - 150	Unmasked	Warning
Card 2 UC Temperature	35	70	0 - 150	Unmasked	Warning
Card 3 FPGA Temperature	46	70	0 - 150	Unmasked	Warning
Card 3 UC Temperature	27	70	0 - 150	Unmasked	Warning
Card 4 FPGA Temperature	45	70	0 - 150	Unmasked	Warning
Card 4 UC Temperature	30	70	0 - 150	Unmasked	Warning
Card 5 FPGA Temperature	0	70	0 - 150	Unmasked	Warning
Card 5 UC Temperature	0	70	0 - 150	Unmasked	Warning
Card 6 FPGA Temperature	0	70	0 - 150	Unmasked	Warning
Card 6 UC Temperature	0	70	0 - 150	Unmasked	Warning
Card 7 FPGA Temperature	0	70	0 - 150	Unmasked	Warning
Card 7 UC Temperature	0	70	0 - 150	Unmasked	Warning
Card 8 FPGA Temperature	0	70	0 - 150	Unmasked	Warning
Card 8 UC Temperature	0	70	0 - 150	Unmasked	Warning

Figure 4.7 Temperature Alarms Web Page

Caution!

Increasing the threshold from this factory default setting may prevent the unit generating an alarm during a fan failure or air-conditioning failure event.

4.4.6 PSU Alarms

The EQ8096 utilizes up to 2 Hot-swappable PSUs and supports PSU failure detection for each PSU fitted.

When dual-redundant PSUs are fitted (option EQ8096/HWO/DPS), the power supplies operate in a load-shared scheme. In the rare event of a PSU failure, the remaining PSU will provide power to the unit. In this situation, an alarm will be raised and the PSU unit should be replaced as soon as possible.

When the unit is operating with a single PSU, the Alarm status page will show this as ‘not fitted’ as shown in *Figure 4.8.*

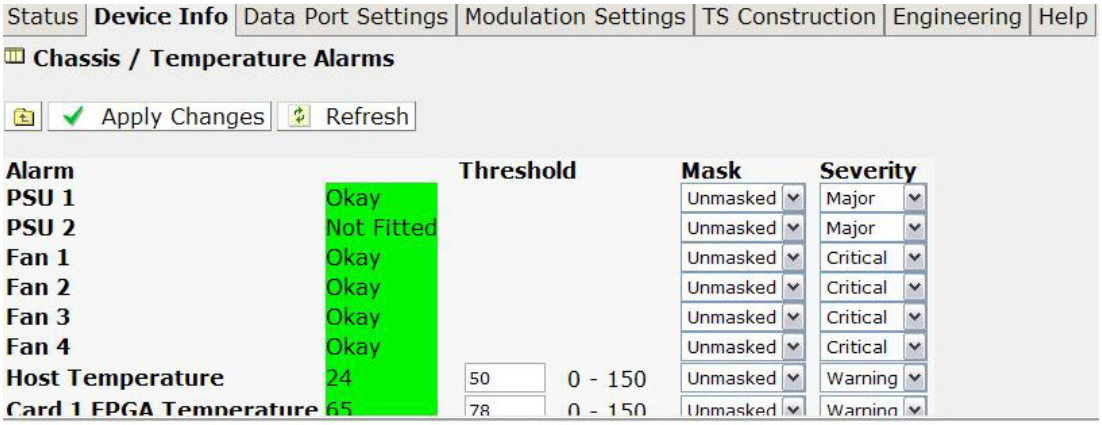


Figure 4.8 PSU Alarms Web Page

4.5 Trap Destination Table

Figure 4.9 shows the Trap (alarm) Destination web page. The Simple Network Management Protocol (SNMP) Trap addresses are set here. Once the addresses of the SNMP servers are entered, any alarms will be broadcast to all destinations. The EQ8096 maintains a list of the last 20 reported alarms (traps) and makes it available to the SNMP management system.

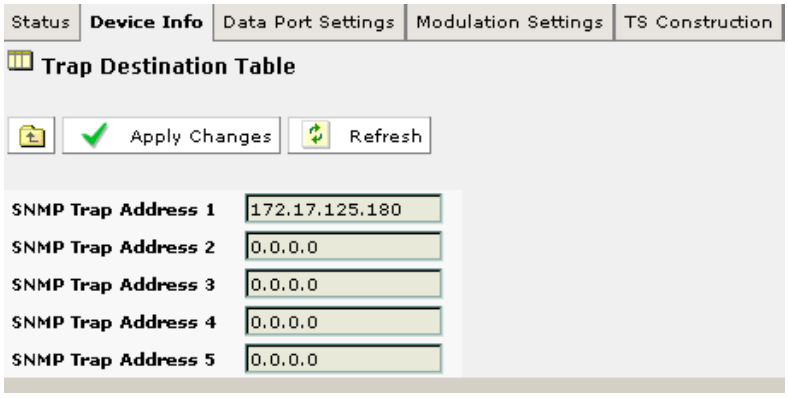


Figure 4.9 Trap Destination Table Web Page

A reference number is allocated to a new alarm to identify it to the management system. This reference number is associated with any changes to the alarm status until it is cleared.

4.6 Status Indicators

4.6.1 Location of the Status Indicators

The status indicators are mounted at the rear panel (see *Figure 4.10*). There are three status indicators per modulator unit. Each indicator relates to the adjacent RF connector.

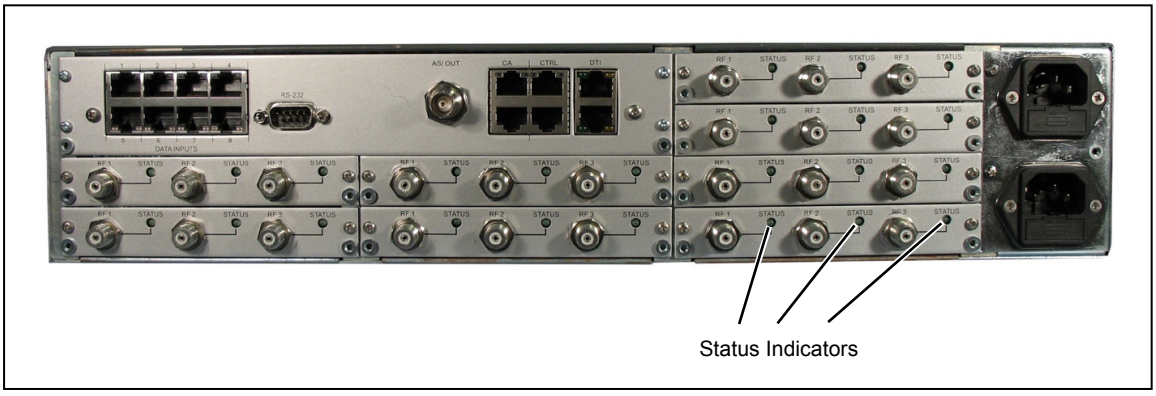


Figure 4.10 Position of the Status Indicators

4.6.2 Indication States

The EQ8096 switches off the Status Indicator as soon as it boots. It remains off until an alarm severity level is established then the LED is turned on accordingly as shown in *Table 4.5*.

Table 4.5 Status LED States

Condition	LED State
ON - RF Enabled on at least one QAMs/Connector, system clocks locked	Steady Green
FLASH - Critical alarm (SW), system clocks NOT locked.	Flashing Green
NO RF (disabled on all channels within connector)	OFF

Note: Critical Alarm.

4.6.3 Ethernet Status Indicator

There are two LEDs carried by each data connector. The left-most LED indicates the channel activity and the right-most LED indicates channel status (Link level connection active). The status LED will glow orange for 1000BaseT and green for 100BaseT.

4.7 Unit Alarm List

Table 4.6 Unit Alarm List

Name	Source	Slot	Alarm Id
Data 1 Connection	Input Card	1	00001001
Data 2 Connection	Input Card	1	00001002
Data 3 Connection	Input Card	1	00001003
Data 4 Connection	Input Card	1	00001004
Serial Number	Input Card	1	00001009
Software Watchdog	Input Card	1	00001010
Card 1	Output Card 1	2	00001028
Card 2	Output Card 2	3	00001029
Card 3	Output Card 3	4	00001030
Card 4	Output Card 4	5	00001031
Card 5	Output Card 5	6	00001032
Card 6	Output Card 6	7	00001033
Card 7	Output Card 7	8	00001034
Card 8	Output Card 8	9	00001035
Open CAS Connection	Input Card	1	00001244
PSU 1	Input Card	1	00001249

Name	Source	Slot	Alarm Id
PSU 2	Input Card	1	00001250
DTI Lock	Input Card	1	00001251
PSIG Connection	Input Card	1	00001348
Lion Over-rate 1	Input Card	1	00001349
Lion Over-rate 2	Input Card	1	00001350
MAC CRC 1 Fail Rate	Input Card	1	00001005
MAC CRC 2 Fail Rate	Input Card	1	00001006
MAC CRC 3 Fail Rate	Input Card	1	00001007
MAC CRC 4 Fail Rate	Input Card	1	00001008
TS 1 Over-rate	Input Card	1	00001036
TS 2 Over-rate	Input Card	1	00001037
TS 3 Over-rate	Input Card	1	00001038
TS 4 Over-rate	Input Card	1	00001039
TS 5 Over-rate	Input Card	1	00001040
TS 6 Over-rate	Input Card	1	00001041
TS 7 Over-rate	Input Card	1	00001042
TS 8 Over-rate	Input Card	1	00001043
TS 9 Over-rate	Input Card	1	00001044
TS 10 Over-rate	Input Card	1	00001045
TS 11 Over-rate	Input Card	1	00001046
TS 12 Over-rate	Input Card	1	00001047
TS 13 Over-rate	Input Card	1	00001048
TS 14 Over-rate	Input Card	1	00001049
TS 15 Over-rate	Input Card	1	00001050
TS 16 Over-rate	Input Card	1	00001051
TS 17 Over-rate	Input Card	1	00001052
TS 18 Over-rate	Input Card	1	00001053
TS 19 Over-rate	Input Card	1	00001054
TS 20 Over-rate	Input Card	1	00001055
TS 21 Over-rate	Input Card	1	00001056
TS 22 Over-rate	Input Card	1	00001057

Name	Source	Slot	Alarm Id
TS 23 Over-rate	Input Card	1	00001058
TS 24 Over-rate	Input Card	1	00001059
TS 25 Over-rate	Input Card	1	00001060
TS 26 Over-rate	Input Card	1	00001061
TS 27 Over-rate	Input Card	1	00001062
TS 28 Over-rate	Input Card	1	00001063
TS 29 Over-rate	Input Card	1	00001064
TS 30 Over-rate	Input Card	1	00001065
TS 31 Over-rate	Input Card	1	00001066
TS 32 Over-rate	Input Card	1	00001067
TS 33 Over-rate	Input Card	1	00001068
TS 34 Over-rate	Input Card	1	00001069
TS 35 Over-rate	Input Card	1	00001070
TS 36 Over-rate	Input Card	1	00001071
TS 37 Over-rate	Input Card	1	00001072
TS 38 Over-rate	Input Card	1	00001073
TS 39 Over-rate	Input Card	1	00001074
TS 40 Over-rate	Input Card	1	00001075
TS 41 Over-rate	Input Card	1	00001076
TS 42 Over-rate	Input Card	1	00001077
TS 43 Over-rate	Input Card	1	00001078
TS 44 Over-rate	Input Card	1	00001079
TS 45 Over-rate	Input Card	1	00001080
TS 46 Over-rate	Input Card	1	00001081
TS 47 Over-rate	Input Card	1	00001082
TS 48 Over-rate	Input Card	1	00001083
TS 49 Over-rate	Input Card	1	00001084
TS 50 Over-rate	Input Card	1	00001085
TS 51 Over-rate	Input Card	1	00001086
TS 52 Over-rate	Input Card	1	00001087
TS 53 Over-rate	Input Card	1	00001088

Name	Source	Slot	Alarm Id
TS 54 Over-rate	Input Card	1	00001089
TS 55 Over-rate	Input Card	1	00001090
TS 56 Over-rate	Input Card	1	00001091
TS 57 Over-rate	Input Card	1	00001092
TS 58 Over-rate	Input Card	1	00001093
TS 59 Over-rate	Input Card	1	00001094
TS 60 Over-rate	Input Card	1	00001095
TS 61 Over-rate	Input Card	1	00001096
TS 62 Over-rate	Input Card	1	00001097
TS 63 Over-rate	Input Card	1	00001098
TS 64 Over-rate	Input Card	1	00001099
TS 65 Over-rate	Input Card	1	00001100
TS 66 Over-rate	Input Card	1	00001101
TS 67 Over-rate	Input Card	1	00001102
TS 68 Over-rate	Input Card	1	00001103
TS 69 Over-rate	Input Card	1	00001104
TS 70 Over-rate	Input Card	1	00001105
TS 71 Over-rate	Input Card	1	00001106
TS 72 Over-rate	Input Card	1	00001107
TS 73 Over-rate	Input Card	1	00001108
TS 74 Over-rate	Input Card	1	00001109
TS 75 Over-rate	Input Card	1	00001110
TS 76 Over-rate	Input Card	1	00001111
TS 77 Over-rate	Input Card	1	00001112
TS 78 Over-rate	Input Card	1	00001113
TS 79 Over-rate	Input Card	1	00001114
TS 80 Over-rate	Input Card	1	00001115
TS 81 Over-rate	Input Card	1	00001116
TS 82 Over-rate	Input Card	1	00001117
TS 83 Over-rate	Input Card	1	00001118
TS 84 Over-rate	Input Card	1	00001119

Name	Source	Slot	Alarm Id
TS 85 Over-rate	Input Card	1	00001120
TS 86 Over-rate	Input Card	1	00001121
TS 87 Over-rate	Input Card	1	00001122
TS 88 Over-rate	Input Card	1	00001123
TS 89 Over-rate	Input Card	1	00001124
TS 90 Over-rate	Input Card	1	00001125
TS 91 Over-rate	Input Card	1	00001126
TS 92 Over-rate	Input Card	1	00001127
TS 93 Over-rate	Input Card	1	00001128
TS 94 Over-rate	Input Card	1	00001129
TS 95 Over-rate	Input Card	1	00001130
TS 96 Over-rate	Input Card	1	00001131
TS 1 Program Number Conflict	Input Card	1	00001132
TS 2 Program Number Conflict	Input Card	1	00001133
TS 3 Program Number Conflict	Input Card	1	00001134
TS 4 Program Number Conflict	Input Card	1	00001135
TS 5 Program Number Conflict	Input Card	1	00001136
TS 6 Program Number Conflict	Input Card	1	00001137
TS 7 Program Number Conflict	Input Card	1	00001138
TS 8 Program Number Conflict	Input Card	1	00001139
TS 9 Program Number Conflict	Input Card	1	00001140
TS 10 Program Number Conflict	Input Card	1	00001141
TS 11 Program Number Conflict	Input Card	1	00001142
TS 12 Program Number Conflict	Input Card	1	00001143
TS 13 Program Number Conflict	Input Card	1	00001144
TS 14 Program Number Conflict	Input Card	1	00001145
TS 15 Program Number Conflict	Input Card	1	00001146
TS 16 Program Number Conflict	Input Card	1	00001147
TS 17 Program Number Conflict	Input Card	1	00001148
TS 18 Program Number Conflict	Input Card	1	00001149
TS 19 Program Number Conflict	Input Card	1	00001150

Name	Source	Slot	Alarm Id
TS 20 Program Number Conflict	Input Card	1	00001151
TS 21 Program Number Conflict	Input Card	1	00001152
TS 22 Program Number Conflict	Input Card	1	00001153
TS 23 Program Number Conflict	Input Card	1	00001154
TS 24 Program Number Conflict	Input Card	1	00001155
TS 25 Program Number Conflict	Input Card	1	00001156
TS 26 Program Number Conflict	Input Card	1	00001157
TS 27 Program Number Conflict	Input Card	1	00001158
TS 28 Program Number Conflict	Input Card	1	00001159
TS 29 Program Number Conflict	Input Card	1	00001160
TS 30 Program Number Conflict	Input Card	1	00001161
TS 31 Program Number Conflict	Input Card	1	00001162
TS 32 Program Number Conflict	Input Card	1	00001163
TS 33 Program Number Conflict	Input Card	1	00001164
TS 34 Program Number Conflict	Input Card	1	00001165
TS 35 Program Number Conflict	Input Card	1	00001166
TS 36 Program Number Conflict	Input Card	1	00001167
TS 37 Program Number Conflict	Input Card	1	00001168
TS 38 Program Number Conflict	Input Card	1	00001169
TS 39 Program Number Conflict	Input Card	1	00001170
TS 40 Program Number Conflict	Input Card	1	00001171
TS 41 Program Number Conflict	Input Card	1	00001172
TS 42 Program Number Conflict	Input Card	1	00001173
TS 43 Program Number Conflict	Input Card	1	00001174
TS 44 Program Number Conflict	Input Card	1	00001175
TS 45 Program Number Conflict	Input Card	1	00001176
TS 46 Program Number Conflict	Input Card	1	00001177
TS 47 Program Number Conflict	Input Card	1	00001178
TS 48 Program Number Conflict	Input Card	1	00001179
TS 49 Program Number Conflict	Input Card	1	00001180
TS 50 Program Number Conflict	Input Card	1	00001181

Name	Source	Slot	Alarm Id
TS 51 Program Number Conflict	Input Card	1	00001182
TS 52 Program Number Conflict	Input Card	1	00001183
TS 53 Program Number Conflict	Input Card	1	00001184
TS 54 Program Number Conflict	Input Card	1	00001185
TS 55 Program Number Conflict	Input Card	1	00001186
TS 56 Program Number Conflict	Input Card	1	00001187
TS 57 Program Number Conflict	Input Card	1	00001188
TS 58 Program Number Conflict	Input Card	1	00001189
TS 59 Program Number Conflict	Input Card	1	00001190
TS 60 Program Number Conflict	Input Card	1	00001191
TS 61 Program Number Conflict	Input Card	1	00001192
TS 62 Program Number Conflict	Input Card	1	00001193
TS 63 Program Number Conflict	Input Card	1	00001194
TS 64 Program Number Conflict	Input Card	1	00001195
TS 65 Program Number Conflict	Input Card	1	00001196
TS 66 Program Number Conflict	Input Card	1	00001197
TS 67 Program Number Conflict	Input Card	1	00001198
TS 68 Program Number Conflict	Input Card	1	00001199
TS 69 Program Number Conflict	Input Card	1	00001200
TS 70 Program Number Conflict	Input Card	1	00001201
TS 71 Program Number Conflict	Input Card	1	00001202
TS 72 Program Number Conflict	Input Card	1	00001203
TS 73 Program Number Conflict	Input Card	1	00001204
TS 74 Program Number Conflict	Input Card	1	00001205
TS 75 Program Number Conflict	Input Card	1	00001206
TS 76 Program Number Conflict	Input Card	1	00001207
TS 77 Program Number Conflict	Input Card	1	00001208
TS 78 Program Number Conflict	Input Card	1	00001209
TS 79 Program Number Conflict	Input Card	1	00001210
TS 80 Program Number Conflict	Input Card	1	00001211
TS 81 Program Number Conflict	Input Card	1	00001212

Name	Source	Slot	Alarm Id
TS 82 Program Number Conflict	Input Card	1	00001213
TS 83 Program Number Conflict	Input Card	1	00001214
TS 84 Program Number Conflict	Input Card	1	00001215
TS 85 Program Number Conflict	Input Card	1	00001216
TS 86 Program Number Conflict	Input Card	1	00001217
TS 87 Program Number Conflict	Input Card	1	00001218
TS 88 Program Number Conflict	Input Card	1	00001219
TS 89 Program Number Conflict	Input Card	1	00001220
TS 90 Program Number Conflict	Input Card	1	00001221
TS 91 Program Number Conflict	Input Card	1	00001222
TS 92 Program Number Conflict	Input Card	1	00001223
TS 93 Program Number Conflict	Input Card	1	00001224
TS 94 Program Number Conflict	Input Card	1	00001225
TS 95 Program Number Conflict	Input Card	1	00001226
TS 96 Program Number Conflict	Input Card	1	00001227
ECMG 1 Connection	Input Card	1	00001228
ECMG 2 Connection	Input Card	1	00001229
ECMG 3 Connection	Input Card	1	00001230
ECMG 4 Connection	Input Card	1	00001231
ECMG 5 Connection	Input Card	1	00001232
ECMG 6 Connection	Input Card	1	00001233
ECMG 7 Connection	Input Card	1	00001234
ECMG 8 Connection	Input Card	1	00001235
Fan 1	Input Card	1	00001245
Fan 2	Input Card	1	00001246
Fan 3	Input Card	1	00001247
Fan 4	Input Card	1	00001248
TS 1 MPTS Fail	Input Card	1	00001252
TS 2 MPTS Fail	Input Card	1	00001253
TS 3 MPTS Fail	Input Card	1	00001254
TS 4 MPTS Fail	Input Card	1	00001255

Name	Source	Slot	Alarm Id
TS 5 MPTS Fail	Input Card	1	00001256
TS 6 MPTS Fail	Input Card	1	00001257
TS 7 MPTS Fail	Input Card	1	00001258
TS 8 MPTS Fail	Input Card	1	00001259
TS 9 MPTS Fail	Input Card	1	00001260
TS 10 MPTS Fail	Input Card	1	00001261
TS 11 MPTS Fail	Input Card	1	00001262
TS 12 MPTS Fail	Input Card	1	00001263
TS 13 MPTS Fail	Input Card	1	00001264
TS 14 MPTS Fail	Input Card	1	00001265
TS 15 MPTS Fail	Input Card	1	00001266
TS 16 MPTS Fail	Input Card	1	00001267
TS 17 MPTS Fail	Input Card	1	00001268
TS 18 MPTS Fail	Input Card	1	00001269
TS 19 MPTS Fail	Input Card	1	00001270
TS 20 MPTS Fail	Input Card	1	00001271
TS 21 MPTS Fail	Input Card	1	00001272
TS 22 MPTS Fail	Input Card	1	00001273
TS 23 MPTS Fail	Input Card	1	00001274
TS 24 MPTS Fail	Input Card	1	00001275
TS 25 MPTS Fail	Input Card	1	00001276
TS 26 MPTS Fail	Input Card	1	00001277
TS 27 MPTS Fail	Input Card	1	00001278
TS 28 MPTS Fail	Input Card	1	00001279
TS 29 MPTS Fail	Input Card	1	00001280
TS 30 MPTS Fail	Input Card	1	00001281
TS 31 MPTS Fail	Input Card	1	00001282
TS 32 MPTS Fail	Input Card	1	00001283
TS 33 MPTS Fail	Input Card	1	00001284
TS 34 MPTS Fail	Input Card	1	00001285
TS 35 MPTS Fail	Input Card	1	00001286

Name	Source	Slot	Alarm Id
TS 36 MPTS Fail	Input Card	1	00001287
TS 37 MPTS Fail	Input Card	1	00001288
TS 38 MPTS Fail	Input Card	1	00001289
TS 39 MPTS Fail	Input Card	1	00001290
TS 40 MPTS Fail	Input Card	1	00001291
TS 41 MPTS Fail	Input Card	1	00001292
TS 42 MPTS Fail	Input Card	1	00001293
TS 43 MPTS Fail	Input Card	1	00001294
TS 44 MPTS Fail	Input Card	1	00001295
TS 45 MPTS Fail	Input Card	1	00001296
TS 46 MPTS Fail	Input Card	1	00001297
TS 47 MPTS Fail	Input Card	1	00001298
TS 48 MPTS Fail	Input Card	1	00001299
TS 49 MPTS Fail	Input Card	1	00001300
TS 50 MPTS Fail	Input Card	1	00001301
TS 51 MPTS Fail	Input Card	1	00001302
TS 52 MPTS Fail	Input Card	1	00001303
TS 53 MPTS Fail	Input Card	1	00001304
TS 54 MPTS Fail	Input Card	1	00001305
TS 55 MPTS Fail	Input Card	1	00001306
TS 56 MPTS Fail	Input Card	1	00001307
TS 57 MPTS Fail	Input Card	1	00001308
TS 58 MPTS Fail	Input Card	1	00001309
TS 59 MPTS Fail	Input Card	1	00001310
TS 60 MPTS Fail	Input Card	1	00001311
TS 61 MPTS Fail	Input Card	1	00001312
TS 62 MPTS Fail	Input Card	1	00001313
TS 63 MPTS Fail	Input Card	1	00001314
TS 64 MPTS Fail	Input Card	1	00001315
TS 65 MPTS Fail	Input Card	1	00001316
TS 66 MPTS Fail	Input Card	1	00001317

Name	Source	Slot	Alarm Id
TS 67 MPTS Fail	Input Card	1	00001318
TS 68 MPTS Fail	Input Card	1	00001319
TS 69 MPTS Fail	Input Card	1	00001320
TS 70 MPTS Fail	Input Card	1	00001321
TS 71 MPTS Fail	Input Card	1	00001322
TS 72 MPTS Fail	Input Card	1	00001323
TS 73 MPTS Fail	Input Card	1	00001324
TS 74 MPTS Fail	Input Card	1	00001325
TS 75 MPTS Fail	Input Card	1	00001326
TS 76 MPTS Fail	Input Card	1	00001327
TS 77 MPTS Fail	Input Card	1	00001328
TS 78 MPTS Fail	Input Card	1	00001329
TS 79 MPTS Fail	Input Card	1	00001330
TS 80 MPTS Fail	Input Card	1	00001331
TS 81 MPTS Fail	Input Card	1	00001332
TS 82 MPTS Fail	Input Card	1	00001333
TS 83 MPTS Fail	Input Card	1	00001334
TS 84 MPTS Fail	Input Card	1	00001335
TS 85 MPTS Fail	Input Card	1	00001336
TS 86 MPTS Fail	Input Card	1	00001337
TS 87 MPTS Fail	Input Card	1	00001338
TS 88 MPTS Fail	Input Card	1	00001339
TS 89 MPTS Fail	Input Card	1	00001340
TS 90 MPTS Fail	Input Card	1	00001341
TS 91 MPTS Fail	Input Card	1	00001342
TS 92 MPTS Fail	Input Card	1	00001343
TS 93 MPTS Fail	Input Card	1	00001344
TS 94 MPTS Fail	Input Card	1	00001345
TS 95 MPTS Fail	Input Card	1	00001346
TS 96 MPTS Fail	Input Card	1	00001347
Host Temperature	Input Card	1	00001011

Name	Source	Slot	Alarm Id
Card 1 FPGA Temperature	Output Card 1	2	00001012
Card 2 FPGA Temperature	Output Card 2	3	00001013
Card 3 FPGA Temperature	Output Card 3	4	00001014
Card 4 FPGA Temperature	Output Card 4	5	00001015
Card 5 FPGA Temperature	Output Card 5	6	00001016
Card 6 FPGA Temperature	Output Card 6	7	00001017
Card 7 FPGA Temperature	Output Card 7	8	00001018
Card 8 FPGA Temperature	Output Card 8	9	00001019
Card 1 UC Temperature	Output Card 1	2	00001020
Card 2 UC Temperature	Output Card 2	3	00001021
Card 3 UC Temperature	Output Card 3	4	00001022
Card 4 UC Temperature	Output Card 4	5	00001023
Card 5 UC Temperature	Output Card 5	6	00001024
Card 6 UC Temperature	Output Card 6	7	00001025
Card 7 UC Temperature	Output Card 7	8	00001026
Card 8 UC Temperature	Output Card 8	9	00001027
ECMG 1 Other Connected	Input Card	1	00001236
ECMG 2 Other Connected	Input Card	1	00001237
ECMG 3 Other Connected	Input Card	1	00001238
ECMG 4 Other Connected	Input Card	1	00001239
ECMG 5 Other Connected	Input Card	1	00001240
ECMG 6 Other Connected	Input Card	1	00001241
ECMG 7 Other Connected	Input Card	1	00001242
ECMG 8 Other Connected	Input Card	1	00001243

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Configuration of Conditional Access Using XML File Download

Chapter 5

Contents

5.1	Introduction	5-3
5.2	FTP File Transfer	5-3
5.3	XML Files	5-3
5.3.1	XML File Format	5-4
5.3.2	Status File Examples	5-4
5.3.2.1	No ECMG Configured	5-4
5.3.2.2	Status When ECMG is Configured via Web pages	5-5
5.3.2.3	EMM Service	5-7
5.3.2.4	Multiple EMM Streams and Connections	5-8
5.4	Configuration Using XML file via FTP	5-9
5.4.1	EMM Connections	5-9
5.4.2	Changing EMM Stream Bandwidth	5-10
5.4.3	Deleting an EMM Stream	5-11
5.4.4	Multiple EMM Streams	5-12
5.4.5	Defining Scrambling Control Groups	5-12
5.4.6	Changing Access Criteria	5-14
5.4.7	Stopping Encryption	5-14
5.4.8	Simulcrypt	5-15
5.4.9	Configuring XML File for Scrambling All TS	5-16
5.5	Errors during FTP	5-17
5.6	File Format When a Channel is Encrypted	5-17
5.7	Storing Configuration File	5-19
5.8	Redundancy Switch	5-20

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5.1 Introduction

This chapter provides details of how to configure the unit for service/component scrambling (static conditional access event definition) when an external EIS 'Event Information System' is not available.

5.2 FTP File Transfer

It is possible to retrieve the current configuration from the unit and to enter a new configuration into the unit by FTP to transfer XML files.

The configuration and status files described in *Section 5.3* and *5.4* are transferred to and from the unit using FTP.

To connect to the unit the username and password shall be as follows (case sensitive):

Username: engineer

Password: 96QAM

Note: The unit will only accept one FTP session, so if there is no request for a username and password a session is already open that needs to be closed.

5.3 XML Files

When connected to the unit by FTP there are two files that can be retrieved using the 'get' command:

- **caconfig** - this contains all the parameters which can be set by the XML interface.
- **castatus** - this contains all the parameters that are in caconfig plus some additional information pertaining to the configuration that has been set using the web interface. These additional parameters cannot be modified using the XML interface.

This file can also be viewed on the web browser by selecting **CA Status File** from the **CA Settings** page under the **Conditional Access** tab.

Note: Early versions of Internet Explorer may not allow the XML file to be viewed correctly.

The configuration file caconfig can be edited as required to modify existing settings or to include new settings. The new CA configuration can be loaded into the unit using the FTP 'put' command:

- **put caconfig** - this action will not reset the current configuration, but will add to or modify the relevant settings.

Note: Parameters that are configurable using the web browser GUI cannot be modified using the XML file.

5.3.1 XML File Format

All the XML files follow this format:

```
<?xml version="1.0" encoding="UTF-8"?>

<simulcrypt_config>

  <ecmg>

  </ecmg>

  <emmg>

  </emmg>

</simulcrypt_config>
```

The ECMG information is located in between `<ecmg>` and `</ecmg>`, the EMMG information in between `<emmg>` and `</emmg>`.

Every ‘field’ (in between `<identifier>` and `</identifier>`) has a format. When this is a number, it can be entered as either decimal or hexadecimal (preceded by 0x).

The spacing is not important within the file, but every ‘field’ opened must be closed. Any unknown field is ignored, so it is important to ensure that the spelling of field names is correct.

New lines are ignored, so the file format can be on a single line (may be useful for large configuration files.

```
<simulcrypt_config><ecmg></ecmg><emmg></emmg></simulcrypt_conf
ig>
```

Note: The FTP configuration is not automatically stored within the unit and will be cleared each time the unit is reset or power cycled.

See *Section 5.7* for details on storing the configuration file.

5.3.2 Status File Examples

The castatus file shows the parameters that have been set using the GUI on the web interface.

5.3.2.1 No ECMG Configured

In the following castatus file no ECMG is configured and only ‘CA ECM PID ranges’ for the first and second output are configured.

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_status>
  <ecmg>
    <timeout>10</timeout>
    <min_cp_duration>600</min_cp_duration>
    <test_interval>17</test_interval>
    <ECM_PID_output0min>0x1D00</ECM_PID_output0min>
    <ECM_PID_output0max>0x1E00</ECM_PID_output0max>
    <ECM_PID_output1min>0x1C00</ECM_PID_output1min>
    <ECM_PID_output1max>0x1D00</ECM_PID_output1max>
  </ecmg>
<emmg>
    <emm_tcp_port>2000</emm_tcp_port>
    <emm_udp_port>2100</emm_udp_port>
    <pd_udp_port>2200</pd_udp_port>
  </emmg>
</simulcrypt_status>
```

5.3.2.2 Status When ECMG is Configured via Web pages

For each ECMG that is configured the following block will appear in *castatus* (in this case the ECMG is not connected)*:*

```
  <ecmg_connection>
      <supercasid>0x1234567</supercasid>
      <main_ip>192.168.3.181</main_ip>
      <redundant_ip>0.0.0.0</redundant_ip>
      <curecmg>MAIN</curecmg>
      <port>11111</port>
      <state>C_CLOSED</state>
      <protocol_version>2</protocol_version>
      <ecm_channel_id>0x1264</ecm_channel_id>
    </ecmg_connection>
```

If the unit tries to establish a connection but has not yet been successful the following additional parameters will be included:

```
<state>C_OPENING</state>
<protocol_version>2</protocol_version>
<ecm_channel_id>0x1264</ecm_channel_id>
<section_tspkt_flag>0</section_tspkt_flag>
<ecm_rep_period_ms>0</ecm_rep_period_ms>
<max_streams>0</max_streams>
<max_comp_time_ms>0</max_comp_time_ms>
```

If the ECMG connection is successfully established, the resulting file will include actual values:

```
<state>C_OPEN</state>
<protocol_version>2</protocol_version>
<ecm_channel_id>0x1264</ecm_channel_id>
<section_tspkt_flag>0</section_tspkt_flag>
<ecm_rep_period_ms>100</ecm_rep_period_ms>
<max_streams>50</max_streams>
<max_comp_time_ms>2000</max_comp_time_ms>
```

5.3.2.3 EMM Service

If an EMM service has been initialized, but no server is connected, the following information will be contained within the `<emmg></emmg>` field:

```
<emm_connection>
    <client_id>0x1230000</client_id>
    <channel_id>0x1</channel_id>
    <emm_stream>
      <emm_stream_id>0x1</emm_stream_id>
      <pid>0x700</pid>
      <output_mask>0x1</output_mask>
      <bandwidth>500</bandwidth>
      <data_type>0</data_type>
      <data_id>0x0</data_id>
      <npkts_max>0</npkts_max>
      <nb_per_tick>0</nb_per_tick>
    </emm_stream>
 </emm_connection>
```

- `data_id` is transmitted inside the EMM packets coming from the EMMG.
- `npkts_max` is the maximum number of packets which can be buffered inside the unit.
- `nb_per_tick` is the number of EMM packets to send at each millisecond.

Once a server is connected the following additional information becomes available:

```
 <data_id>0x1</data_id>
     <npkts_max>5053</npkts_max>
     <nb_per_tick>13</nb_per_tick>
     <socket>18</socket>
     <version>2</version>
     <last_rxtime>1122</last_rxtime>
     <section_tspkt_flag>0</section_tspkt_flag>
     <client_ipaddr>172.17.223.124</client_ipaddr>
     <client_port>1483</client_port>
```

5.3.2.4 Multiple EMM Streams and Connections

It is possible to have multiple <emm_stream> per <emm_connection> and multiple <emm_connection> per <emmg>, as shown in the following example:

```
<emmg>
  <emm_tcp_port>2000</emm_tcp_port>
  <emm_udp_port>2100</emm_udp_port>
  <pd_udp_port>2200</pd_udp_port>
  <emm_connection>
    <client_id>0x1230000</client_id>
    <channel_id>0x1</channel_id>
    <emm_stream>
      <emm_stream_id>0x1</emm_stream_id>
      ……
    </emm_stream>
  </emm_connection>
  <emm_connection>
    <client_id>0x1200000</client_id>
    <channel_id>0x4</channel_id>
    <emm_stream>
      <emm_stream_id>0x2</emm_stream_id>
      ……
    </emm_stream>
    <emm_stream>
      <emm_stream_id>0x3</emm_stream_id>
      ……
    </emm_stream>
  </emm_connection>
</emmg>
```

5.4 Configuration Using XML file via FTP

When the **caconfig** XML file has been edited to include new parameters it can be loaded into the unit by connecting via ftp and using **put caconfig**.

The parameters used in the XML file are derived from the OPENCAS interface: SCTE Proposed Standard Head-end Implementation of OpenCAS(TM) SCTE DVS/278, Revised July 31st 2000.

5.4.1 EMM Connections

For the EMM connections, the only parameters that can be set by putting the file **caconfig** using FTP are:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
  </ecmg>
  <emmg>
    <emm_connection>
      <client_id>0x1230000</client_id>
      <channel_id>0x1</channel_id>
      <emm_stream>
        <emm_stream_id>0x1</emm_stream_id>
        <pid>0x700</pid>
        <output_mask>0x1</output_mask>
        <bandwidth>500</bandwidth>
        <data_type>0</data_type>
      </emm_stream>
    </emm_connection>
  </emmg>
</simulcrypt_config>
```

- `client_id` is usually taken as the SupercasID of the ECMG/EMMG provider.
- `channel_id` must be different for each `emm_connection`.
- `emm_stream_id` must be different for each `emm_stream`.

- `pid` is the PID used to put the EMM data onto the output.
- `output_mask` is a bit mask to define which outputs will contain the EMM data (all on the same PID). The maximum is 0xFFFFFFFFFFFFFFFFFFFFFFFF, which will enable EMMs on all 96 outputs. (Example: to enable EMMs on outputs 1,5 and 9 set the mask to 0x00000111,and so on). Outputs that are not active (i.e. no programs) should not be included.
- `bandwidth` is expressed in kbps.

`data_type` shall be 0 for EMM and 1 for Private Data.

Note: The **client_id** and **channel_id** must be the same as the one configured in the EMMG for the unit to accept the connection.

5.4.2 Changing EMM Stream Bandwidth

To change just the bandwidth of an existing **emm_stream**, the same parameters all need to be sent, but with an **output_mask** of zero and the new bandwidth setting included:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
  </ecmg>
  <emmg>
    <emm_connection>
      <client_id>0x1230000</client_id>
      <channel_id>0x1</channel_id>
      <emm_stream>
        <emm_stream_id>0x1</emm_stream_id>
        <pid>0x700</pid>
        <output_mask>0</output_mask>
        <bandwidth>900</bandwidth>
        <data_type>0</data_type>
      </emm_stream>
    </emm_connection>
  </emmg>
</simulcrypt_config>
```

5.4.3 Deleting an EMM Stream

To delete an EMM stream, the parameters need to be sent as before, with an **output_mask** of zero, but the bandwidth parameter should not be included:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
  </ecmg>
  <emmg>
    <emm_connection>
      <client_id>0x1230000</client_id>
      <channel_id>0x1</channel_id>
      <emm_stream>
        <emm_stream_id>0x1</emm_stream_id>
        <pid>0x700</pid>
        <output_mask>0</output_mask>
        <data_type>0</data_type>
      </emm_stream>
    </emm_connection>
  </emmg>
</simulcrypt_config>
```

5.4.4 Multiple EMM Streams

More than one EMM stream can be defined in one EMM connection:

```
<emm_connection>
  <client_id>0x1200000</client_id>
  <channel_id>0x4</channel_id>
  <emm_stream>
    <emm_stream_id>0x2</emm_stream_id>
    <pid>0x710</pid>
    <output_mask>0x1</output_mask>
    <bandwidth>100</bandwidth>
    <data_type>0</data_type>
  </emm_stream>
  <emm_stream>
    <emm_stream_id>0x3</emm_stream_id>
    <pid>0x711</pid>
    <output_mask>0x1</output_mask>
    <bandwidth>100</bandwidth>
    <data_type>0</data_type>
  </emm_stream>
</emm_connection>
```

5.4.5 Defining Scrambling Control Groups

It is also possible to define Scrambling Control Groups using **caconfig**. To do this a group `<scg>…</sgc>` must be added into `<ecmg>…</ecmg>`:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
    <scg>
      <scg_id>0x100</scg_id>
      <transport_stream_id>102</transport_stream_id>
```

```
      <cp_duration_ds>600</cp_duration_ds>
      <program_number>10</program_number>
      <key_no>41</key_no>
      <ecm_group>
        <ecm_id>0x100</ecm_id>
        <super_cas_id>0xD000000</super_cas_id>
<access_criteria>111111222222333334444446666</access_criteria>
      </ecm_group>
    </scg>
  </ecmg>
  <emmg>
  </emmg>
</simulcrypt_config>
```

- The `scg_id` shall be different for each SCG. The usual value for this is (**output_index**<<8) + **program_index**, making each unique.
- The `transport_stream_id` and `program_number` are set in the unit configuration.

Note: The `transport_stream_id` in this case is actually the transport stream index which starts at 0 (i.e. output 1 = **transport_stream_id 0**, output 2 = **transport_stream_id 1** and so on).

- The `cp_duration_ds` is the minimum duration of the crypto period in decisecond (1/10 of a second). This shall be higher than the value set on the web browser for crypto period duration and shall also be higher than the value that the ECMG may declare as its minimum crypto period duration at the time of connection (the parameter **nominal_cp_duration** that is present in the **channel_setup** message of OPENCAS).
- The `key_no` has to be different for each SCG and be below 512.
- The `ecm_group` shall contain the relevant super_cas_id and access_criteria (max 1 kbyte),
- The `ecm_id` shall have the following construction:
- (**output_index** << 8) + (64 * **simul_stream**) + **program_index**.
- **simul_stream** is kept as 0 as long as simulcrypting is not used (same program number encrypted by multiple ECMGs / multiple SuperCasID)
- Its lower byte, i.e. (64 * **simul_stream** + **program_index**) will be the offset added to the **ECM_PID_output<output_index>min** and has to be lower than **ECM_PID_output<output_index>max**.

5.4.6 Changing Access Criteria

To change the **access_criteria**, the same file is used with the <access_criteria> field changed as required:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
    <scg>
      <scg_id>0x100</scg_id>
      <transport_stream_id>102</transport_stream_id>
      <cp_duration_ds>600</cp_duration_ds>
      <program_number>10</program_number>
      <key_no>41</key_no>
      <ecm_group>
        <ecm_id>0x100</ecm_id>
        <super_cas_id>0xD000000</super_cas_id>
<access_criteria>1111112222223331334444446666</access_criteria>
      </ecm_group>
    </scg>
  </ecmg>
  <emmg>
  </emmg>
</simulcrypt_config>
```

5.4.7 Stopping Encryption

If the <cp_duration_ds> is not given in the XML file, then the XML parser will interpret that as a request to STOP the encryption with this key. In this case there is no need to add any <ecm_group> information.

To stop the previous encryption, the following format should be used:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
    <scg>
      <scg_id>0x100</scg_id>
      <transport_stream_id>102</transport_stream_id>
      <program_number>10</program_number>
      <key_no>41</key_no>
    </scg>
  </ecmg>
  <emmg>
  </emmg>
</simulcrypt_config>
```

5.4.8 Simulcrypt

When Simulcrypt is being used (multiple ECM streams containing the same Control Word), there will be multiple `<ecm_group>` definitions:

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
    <scg>
      <scg_id>0x0</scg_id>
      <transport_stream_id>101</transport_stream_id>
      <cp_duration_ds>600</cp_duration_ds>
      <program_number>10</program_number>
      <key_no>128</key_no>
      <ecm_group>
        <ecm_id>0x0</ecm_id>
        <super_cas_id>0x0000001</super_cas_id>
        <access_criteria>00000011</access_criteria>
```

```
        </ecm_group>
        <ecm_group>
          <ecm_id>0x40</ecm_id>
          <super_cas_id>0x00000002</super_cas_id>
          <access_criteria>00000022</access_criteria>
        </ecm_group>
        <ecm_group>
          <ecm_id>0x80</ecm_id>
          <super_cas_id>0x1000000</super_cas_id>
      <access_criteria>11111122222233333334444446666</access_criteria>
        </ecm_group>
      </scg>
    </ecmg>
    <emmg>
    </emmg>
</simulcrypt_config>
```

The total size of the **access_criteria** must be lower than 4 Kbytes.

5.4.9 Configuring XML File for Scrambling All TS

When the EQ8096 needs to be configured to scramble all TS, a value of -1 needs to be utilized for **<transport_stream_id>**. If all program numbers within that TS need to be scrambled then a value of -1 also needs to be utilized for **<program_number>**. A sample XML code is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<simulcrypt_config>
  <ecmg>
    <scg>
         <scg_id>0x100</scg_id>
         <transport_stream_id>-1</transport_stream_id>
         <cp_duration_ds>100</cp_duration_ds>
```

```
            <program_number>-1</program_number>
            <key_no>1</key_no>
            <ecm_group>
               <ecm_id>0x1</ecm_id>
               <super_cas_id>0x18610000</super_cas_id>
               <access_criteria>0001</access_criteria>
            </ecm_group>
      </scg>
   </ecmg>
   <emmg>
   </emmg>
</simulcrypt_config>
```

5.5 Errors during FTP

If an error occurs while loading the configuration file by ‘putting’ the XML file with FTP, nothing is reported to the initiator of FTP.

get caconfig to determine what parameters have been accepted

get castatus to see the overall unit status.

A log file can be generated which may help establish what the error is by using the unit serial interface. From the command prompt type **am** then type **sym_log ctl 8**. This should be active and running at the time the file transfer is taking place.

5.6 File Format When a Channel is Encrypted

When a channel is encypted, a small structure modification happens: `<ecm_group>...</ecm_group>` moves into a `<key>...</key>` block.

Resulting file using GET CACONFIG:

```
      <scg>
         <scg_id>0x100</scg_id>
         <transport_stream_id>102</transport_stream_id>
         <cp_duration_ds>600</cp_duration_ds>
         <program_number>-1</program_number>
```

```
      <key_no>41</key_no>
      <ecm_group>
        <ecm_id>0x100</ecm_id>
        <super_cas_id>0x1000000</super_cas_id>
<access_criteria>111111222222333333444444666</access_criteria>
      </ecm_group>
    </scg>
```

Note: The `program_number` is given as -1 because no service is present on this service number and so no PMT is generated. It is not the value that had been entered via the **caconfig** file (which was 10).

Resulting file using GET CASTATUS:

```
  <scg>
      <scg_id>0x100</scg_id>
      <transport_stream_id>102</transport_stream_id>
      <cp_duration_ds>600</cp_duration_ds>
      <program_number>-1</program_number>
      <key_no>41</key_no>
      <key>
        <refcnt>1</refcnt>
        <cp_waiting>0</cp_waiting>
        <cp_nominal_ds>600</cp_nominal_ds>
```

```
        <ecm_group>
          <ecm_id>0x100</ecm_id>
          <super_cas_id>0x1000000</super_cas_id>

<access_criteria>11111122222233333344444446666</access_criteria>
          <stream_state>
            <state>S_OPEN</state>
            <ecm_pid>0x1C00</ecm_pid>
            <output_mask>0x2</output_mask>
          </stream_state>
        </ecm_group>
        </key>
      </scg>
```

- `refcount` will be bigger than 1 when doing simulcrypt.
- `cp_waiting` may be set to 1 when (one of) the ECMG stop answering requests of ECM to corresponding CW.
- `cp_nominal_ds` will be either the value set in CACONFIG or the minimum value of one of the ECMG participating to this encryption, it is the real CW duration.
- `stream_state` describes the ECM being sent, on which PID and on which output index (0x0001 for first output...).

5.7 Storing Configuration File

When a configuration file is loaded into the unit as described in *Section 5.3* the configuration is not automatically stored. In this case when the unit is reset or power cycled the configuration will be lost and the file will need to be re-loaded. This is convenient for initial configuration testing, when errors may easily be introduced in the XML file.

Once the required caconfig file is correctly generated the file can be stored in the unit by connecting to the unit via ftp and using the following command

ftp>put caconfig casetup

It is possible to review the stored configuration using the unit serial interface. From the command prompt type **am** then type **sym_casetup**.

5.8 Redundancy Switch

To perform a redundancy switch the configuration of the main unit should be retrieved using the FTP **get caconfig** command.

Loading this retrieved file into the backup unit using the FTP **put caconfig** command will then configure it identically to the main unit.

Preventive Maintenance and Fault-finding

Chapter 6

Contents

6.1 Introduction 6-3
6.2 Preventive Maintenance 6-3
6.2.1 Routine Inspection - Cooling Fans 6-3
6.2.2 Cleaning 6-3
6.2.3 Servicing 6-3
6.2.3.1 Damage Requiring Service 6-3
6.2.3.2 Replacement Parts 6-4
6.2.3.3 Checks on Completion of Servicing 6-4
6.2.4 Warranty 6-4
6.2.4.1 Levels of Continuing Ericsson Service Support 6-4
6.3 Alarms 6-4
6.4 Fault-finding 6-5
6.4.1 Fault-finding Philosophy 6-5
6.4.2 Preliminary Checks 6-5
6.4.3 User Accessible Fuse Replacement 6-6
6.4.4 Lithium Battery 6-7
6.5 Power Supply Problems 6-7
6.5.1 Symptoms 6-7
6.5.2 Power LED Unlit 6-7
6.5.3 Fan(s) Not Working/Overheating 6-8
6.5.4 Hot Swapping a PSU (when Dual PSU option fitted) 6-8
6.5.5 Modulator Card Failure 6-9
6.5.6 Hot Swapping a Modulator Card 6-9
6.6 Disposing of This Equipment 6-10

List of Figures

Figure 6.1 Orientation of Fuse Carrier 6-6

List of Tables

Table 6.1 Power LED Unlit Fault-finding 6-7
Table 6.2 Fans Not Working/Overheating 6-8
Table 6.3 Modulator Card Fault-finding 6-9

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6.1 Introduction

This chapter provides the schedules and instructions, where applicable, for routine inspection, cleaning and maintenance of the equipment which should be performed by an operator. There are also some basic fault-finding procedures to follow in the event of a suspected EQ8096 failure.

6.2 Preventive Maintenance

6.2.1 Routine Inspection - Cooling Fans

The fans on the EQ8096 should be on continuously.

Note: Failure to ensure a free flow of air around the unit may cause overheating. See *Section 6.5.3, Fan(s) Not Working/Overheating* for further information.

6.2.2 Cleaning

Caution!

Do not use liquid cleaners or aerosol cleaners.

Unplug the EQ8096 from the wall outlet before cleaning the exterior with a damp cloth.

Note: Only the exterior of the case should be cleaned.

6.2.3 Servicing

6.2.3.1 Damage Requiring Service

Warning!

Removing the covers of this equipment may invalidate any warranties, cause a safety hazard or/and affect the EMC performance.

Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- When the power supply cord or plug is damaged.
- If liquid has been spilled, or objects have fallen into the product.

- If the product has been exposed to rain or water.
- If the product does not operate normally by following the operating instructions.
- If the product has been dropped or the case has been damaged.
- When the product exhibits a distinct change in performance.

6.2.3.2 Replacement Parts

When replacement parts are required, be sure the service technician has used parts specified by the manufacturer or which have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock or other hazards.

6.2.3.3 Checks on Completion of Servicing

Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in a safe operating condition. Also, performance and EMC checks may be required.

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6.2.4 Warranty

All Ericsson products and systems are designed and built to the highest standards and are covered under a comprehensive 12 month warranty.

6.2.4.1 Levels of Continuing Ericsson Service Support

For standalone equipment, then Ericsson **BASIC Essential support** is the value for money choice for you. **BASIC** provides you with year-by-year Service long after the warranty has expired.

Call Ericsson Sales for more details..

6.3 Alarms

Refer to *Chapter 4* for information regarding alarms.

6.4 Fault-finding

6.4.1 Fault-finding Philosophy

It is the objective of this chapter to provide sufficient information to enable the operator to rectify apparent faults or else to identify the suspect module, where possible. Some basic procedures are provided to follow in the event of a suspected EQ8096 failure. It is assumed that fault-finding has already been performed at a system level and that other equipment units have been eliminated as the possible cause of the failure (see relevant System Manual).

Warning!

Removing the covers of this equipment may invalidate any warranties, cause a safety hazard or/and affect the EMC performance.

Caution!

Do not remove the covers of this equipment. Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

This Reference Guide does not include any maintenance information or procedures that would require the removal of covers.

If the following information fails to clear the abnormal condition, call a Service Engineer or contact Customer Services using the information given in the preliminary pages of this Reference Guide.

6.4.2 Preliminary Checks

Always investigate the failure symptoms fully, prior to taking remedial action. Fault diagnosis for the equipment operator is limited to the following tasks, since the operator should **NOT** remove the covers of the equipment:

1. Check the front panel Power LED (green). If this is not lit, refer to *Table 6.1.*
2. Confirm that the equipment hardware configuration is suitable for the purpose and has been correctly installed and connected (see *Chapter 2, Installing the Equipment*).
3. Confirm that inappropriate operator action is not causing the problem, and that the equipment software set up is capable of performing the task being asked of it. If the validity of the configuration, set up or operation is in doubt, check it (see *Chapter 3, Operating the EQ8096 Using the Web Browser*).
4. Check that the fans are unobstructed and working correctly.

When the failure condition has been fully investigated, and the symptoms are known, proceed with fault-finding according to the observed symptoms. If the fault persists, and cannot be rectified using the instructions given in this Reference Guide, contact Customer Services. Switch off the equipment if it becomes unusable, or to protect it from further damage.

6.4.3 User Accessible Fuse Replacement

Fuses are held in integral fuse carriers at the AC power inlets at the rear panel.

Note: Refer to *Annex B, Section B.3, Power Supply* for more information about the fuse.

To replace the AC power fuse(s):

Warning!

Before replacing the rear panel fuses, disconnect the unit from the supply. Failure to do this may expose hazardous voltages. Unplug the unit from the local supply socket.

1. Ensure that power is turned off and the power cable is disconnected from the AC power inlet(s).
2. Ease out the fuse carrier by placing a small, flat-bladed screwdriver in the notch at the top of the carrier.

Caution!

When replacing the power input fuses, always ensure that a fuse of the correct type and rating is fitted. Failure to do so results in inadequate protection.

3. Replace the fuse in the carrier.
4. Insert the fuse carrier back in the AC power inlet.

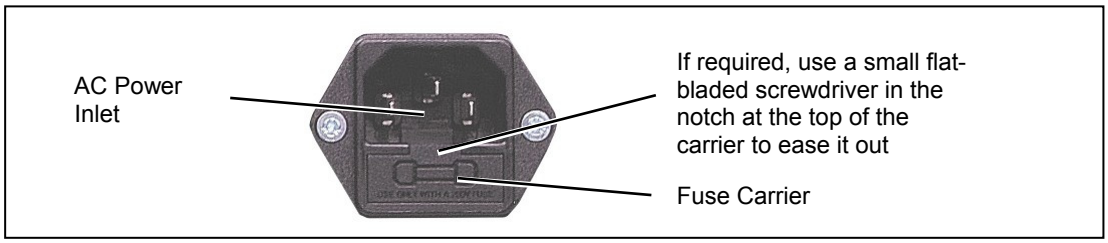
AC Power Inlet
If required, use a small flat-bladed screwdriver in the notch at the top of the carrier to ease it out
Fuse Carrier

Figure 6.1 Orientation of Fuse Carrier

If the replacement fuse also blows, do not continue. Disconnect the equipment and contact Customer Services for advice.

6.4.4 Lithium Battery

The lithium battery fitted within this product is not user replaceable and as such should only be replaced by qualified service personnel.

6.5 Power Supply Problems

6.5.1 Symptoms

Warning!

Do not attempt to service the Power Supply Unit as opening or removing covers may expose dangerous voltages or other hazards. Refer all servicing to service personnel who have been authorised by Ericsson.

Use the following techniques to fault-find the EQ8096 according to the observed symptom(s) when a power supply failure is suspected.

6.5.2 Power LED Unlit

If the EQ8096 Power LED is unlit, fault-find the problem as detailed in *Table 6.1*.

Table 6.1 Power LED Unlit Fault-finding

Step	Action	If Result of Action is Yes…	If Result of Action is No…
1	**Check Power LED**. Is the EQ8096 still working?	If the EQ8096 is clearly working normally then the **Power LED** itself is probably at fault. Call a Service Engineer.	Proceed to next step.
2	**Check Power Source**. Connect a known-working piece of equipment to the power source outlet. Does it work?	The problem lies within the EQ8096 or power cable. Proceed to next step.	The problem lies with the power source. Check building circuit breakers, fuse boxes, etc. If problem persists, contact the electricity supplier.
3	**Check Power Cable and Fuse**. Unplug the power connector from the EQ8096 and try it in another piece of equipment. Does it work?	The problem lies within the EQ8096. Proceed to next step.	The problem lies with either the cable itself, or with the fuse in the plug. Replace the fuse or try to substitute another cable.

Step	Action	If Result of Action is Yes…	If Result of Action is No…
4	**Check PSU Module(s) and Fuse(s)**. Ensure the power connector is unplugged. Remove the fuse from the rear panel connector and inspect it. Has the fuse blown?	Replace the fuse with one of the correct type and rating (see *Annex B Technical Specification)*. If the PSU still does not work, unplug the power cable and call a Service Engineer.	Possible problem with the PSU module. Call a Service Engineer.

6.5.3 Fan(s) Not Working/Overheating

The unit is fitted with four fans, all of which run continuously. Each individual PCB in the chassis has its own temperature sensor that will highlight if there is a cooling problem. In the event of overheating problems, refer to *Table 6.2*.

Note: Failure to ensure a free air-flow around the unit may cause overheating. This condition is detected by a temperature sensor; it may be used to trigger an automatic alarm.

Table 6.2 Fans Not Working/Overheating

Step	Action	If Result of Action is Yes…	If Result of Action is No…
1	**Check Fan Rotation**. Inspect the fans located at the sides of the enclosure. Are the fans rotating? Check the temperature (select **Temperature Alarms** on the **Device Info** tabbed page).	Check that the EQ8096 has been installed with sufficient space allowed for air-flow (see *Chapter 2, Installing the Equipment*). If the ambient air is too hot, additional cooling may be required.	Possible break in the DC supply from the PSU module to the suspect fan(s). Call a Service Engineer.

6.5.4 Hot Swapping a PSU (when Dual PSU option fitted)

The EQ8096 provides a facility to swap out a PSU whilst the unit is still powered. The EQ8096 supports Compact PCI technology for its PSUs, which offers automatic load sharing and Hot Swap capabilities.

The following procedure describes the steps required to replace a PSU.

1. Loosen the four PSU locking screws fully.
2. Lever out the faulty PSU by firstly pushing inwards the retaining clips followed by pulling outwards the two levers.
3. The PSU can now be slid out of its housing.
4. Replace new PSU unit and lock levers in place. Note that levers will make an audible click when the unit is fully inserted.

5. Tighten the four locking screws.

Notes: Following this procedure does NOT invalidate the warranty.

Obtain a replacement card by contacting Ericsson Customer Support. Ensure that details of the suspected card are available beforehand.

6.5.5 Modulator Card Failure

Use *Table 6.3* to aid in diagnosing a modulator card fault.

Table 6.3 Modulator Card Fault-finding

Step	Action	If Result of Action is Yes…	If Result of Action is No…
1	**Check the status of the Modulator Card.** Check that the modulator card is correctly installed and configured. Is there a modulator failure alarm being shown on the Status web page?	If the unit indicates a critical failure, swap out the card and retest. Refer to *Section 6.5.6* for details.	If no modulator failure alarm is shown, go to Step 2.
2	**Check the status of the RF ports.** Do the ports reflect the reported status?	Discuss the perceived problem with Ericsson Customer Support.	If the port is not providing a valid output when it has been enabled via the Modulation Settings web page, swap out the card and retest. Refer to *Section 6.5.6* for details.

6.5.6 Hot Swapping a Modulator Card

Caution!

This equipment contains Electrostatic Sensitive Devices (ESDs). Appropriate precautions must be observed. Suitable protective devices must be used or worn before handling. Consult international standards or the manufacturer for further details

Please refer to *Chapter 9 'Upgrading EQ8096 with Input and Output Option Cards'.*

Notes: Following this procedure does NOT invalidate the warranty.

Obtain a replacement card by contacting Ericsson Customer Support. Ensure that details of the suspected card are available beforehand.

6.6 Disposing of This Equipment

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Regulations, policies and/or environmental restrictions differ throughout the world. Contact your local jurisdiction or local authority for specific advice on disposal.

Code Upgrade and License Key Entry

Chapter 7

Contents

7.1 Introduction 7-3
7.2 How to Install Software 7-3
7.2.1 Read This First! 7-3
7.2.2 If the IP Address is Not Known 7-3
7.2.3 Software Upgrading 7-4
7.2.4 Output Card Upgrade 7-4
7.3 License Key Entry to Enable/Disable Features 7-4
7.4 Requesting a Key 7-4

List of Figures

Figure 7.1 License Key Entry Web Page 7-5
Figure 7.2 License Key Entry (Power Cycle Required) Web Page 7-5

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7.1 Introduction

This chapter specifies the procedure for upgrading software via FTP and obtaining and entering license keys to enable DVBCA, Authentication, 1GHz RF or M-CMTS functionality on the EQ8096.

The assembly is referred to as the **unit** in this document.

7.2 How to Install Software

7.2.1 Read This First!

Caution!

Upgrading a product will interrupt its normal operation. Code can be loaded at any time without interfering with the unit functionality. However, for the new code to be activated a power cycle is required. Ensure that the unit is not in use at this time.

Before starting, ensure that the programming procedure is well understood.

7.2.2 If the IP Address is Not Known

The unit IP (Main) address can be obtained from the Front Panel LCD; alternatively the user can access the serial port by connecting to a PC running HyperTerminal with the following settings:

- 115200 baud
- 8 data bits
- 1 stop bit
- no parity
- no flow control

To establish the unit IP address connect the serial port as above, power on the unit and the IP address settings will be displayed as part of the boot sequence. Alternatively to display all the control port settings, at the Monitor> prompt type:

Monitor> ipinfo

To set a new IP address type	Monitor> IP3 xxx.xxx.xxx.xxx
To set a subnet mask (if required) type	Monitor> IPMASK3 xxx.xxx.xxx.xxx
To set a default gateway (if required) type	Monitor> IPGATEWAY xxx.xxx.xxx.xxx

7.2.3 Software Upgrading

To upgrade the software:

1. Unzip/save upgrade files to a local directory.
2. Note IP address of EQ unit, make sure local PC can ping it.
3. Open a DOS session and navigate to the directory where the upgrade files are saved.
4. Type ‘up xxx.xxx.xxx.xxx’ where ‘x’ is the IP address of the unit to be upgraded. This runs a batch file that loads all the new code via FTP.
5. Wait until upgrade has finished (DOS prompt comes back).
6. Reboot unit to apply new software/firmware.

7.2.4 Output Card Upgrade

For details on upgrading of output Cards, see *Chapter 9* of this Reference Guide.

7.3 License Key Entry to Enable/Disable Features

The unit is shipped with CA enabled if the option EQ8096/SWO/DVBCA has been ordered at time of purchase.

The unit is shipped with M-CMTS enabled if the option EQ8096/HWO/DTI has been ordered at time of purchase.

The unit is shipped with 1GHz capability enabled if the option EQ8096/SWO/12QAM/1GHZ has been ordered at time of purchase.

If any of the options were not originally ordered, but is subsequently required it is possible to enter a new license key to enable the option (M-CMTS will require fitment of the DTI client card).

A license key can also be obtained to enable/disable Authentication (User name, Password) access to the Web browser. Please contact TTV Customer Services for details on this option.

7.4 Requesting a Key

To request a key:

1. Place an order for any of the options listed in *Section 7.3*, specifying the type of license required on existing EQ8096 unit(s).
2. The order must include the unit serial number (found on the side of the unit or reported on the status web page) and the corresponding unique serial number for each unit that can be found on the web browser under:

   Engineering → Advanced Parameter Functions → License Key Entry

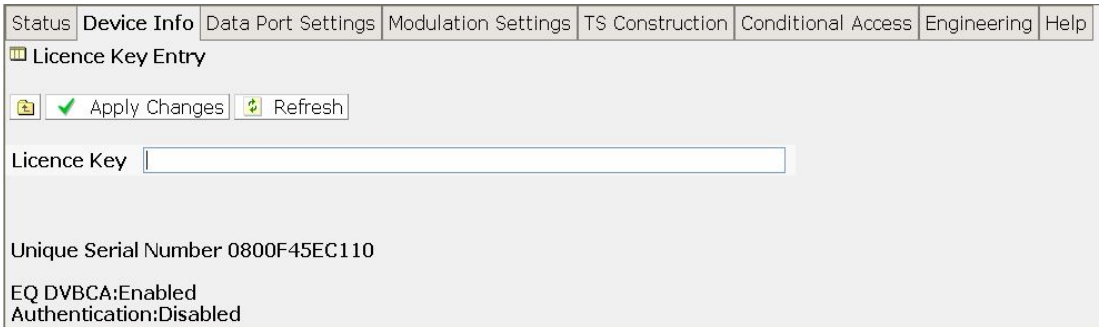

Figure 7.1 License Key Entry Web Page

3. TTV will then supply a license key that is only valid for the unit with the corresponding unique serial number.

4. **Copy the license key** (cut and paste will work) onto the **license key entry** web page (replacing the *** that are displayed as default).

Caution!

Take care to ensure that the license key is inserted into the correct unit.

5. Select **Apply Changes**.

The web page will then report that stored license keys have not been activated and a power cycle is required.

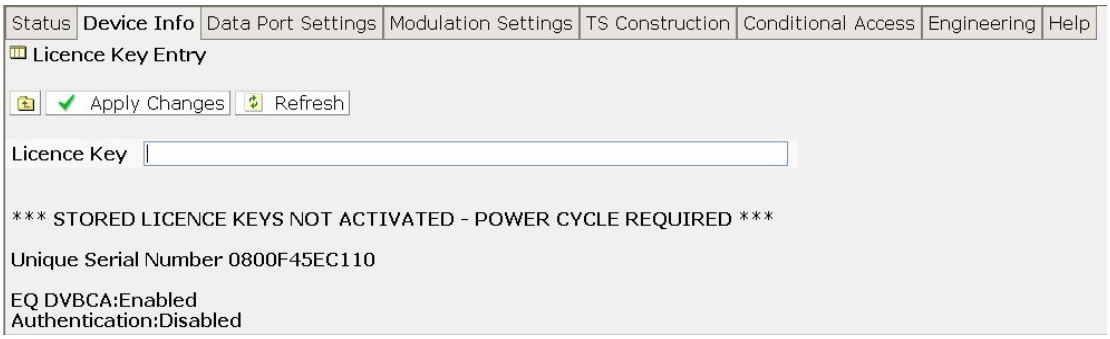

Figure 7.2 License Key Entry (Power Cycle Required) Web Page

6. **Power cycle the unit** and verify that the licensed functionality is enabled:

- **CA enabled:** CA tabbed page available, version information page reports DVBCA enabled.
- **CA disabled:** No CA tabbed page available, version information page reports DVBCA disabled.
- **M-CMTS enabled:** DEPI Stats and DEPI Config tabbed pages available, version information page reports M-CMTS enabled.

- **M-CMTS disabled:** No DEPI Stats and DEPI Config tabbed pages available, version information page reports M-CMTS disabled.
- **1GHz** license applies to the whole unit and will enable 1 GHz revision Option Cards to be used within the chassis. The cards are identified under the ‘Version Information’ tab.

Unit Configuration via FTP

Chapter 8

Contents

8.1 Introduction 8-3
8.2 Generating the Configuration File 8-3
8.3 Configuring Units Using the Stored File 8-4

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8.1 Introduction

This chapter provides details of how to store a unit configuration to a local PC using the FTP **get** command. The stored file can then be used to configure other units with the same parameters using the FTP **put** command.

8.2 Generating the Configuration File

It is possible to retrieve the current configuration from the unit as follows:

- Ensure that all parameters are set as required in the unit (e.g. all outputs are enabled, frequency and modulation set as required).
- Open an ftp session. The display will be something like the following:

  C:\\ftp 172.17.125.32 (unit IP address)

  FTP Upgrade target 172.17.125.32...

  Connected to 172.17.125.32.

  220 EQ8096 (serial number 1) FTP services ready

  User (192.168.0.11:(none)): **engineer**

  331 Password required for user 'engineer'.

  <enter password '96QAM'>

  200 PASS command successful.

  230 Logged in for user 'engineer'

  ftp>

Note: User and Password in **bold** – CASE SENSITIVE

- To read the configuration and store it in a file on the local PC:

  ftp>**get**

  <remote-file> **config**

  <local-file> **EQ8096config.txt**

  200 Set port to 172.17.223.2:1819.

  150 opening data connection

  226 transfer complete.

1400 bytes received in 0.84 seconds <1.66 Kbytes/sec>

ftp>

Note: The unit will only accept one FTP session, so if there is no request for a username and password a session is already open that needs to be closed

8.3 Configuring Units Using the Stored File

The file is written to the unit using the ftp **put** command to one of two file destinations.

Note: The change to the unit configuration is automatically applied.

- Open an ftp session.

  C:\\ftp 172.17.125.32 (unit IP address)

- From the ftp session

  ftp> **put**

  <local-file> **EQ8096config.txt**

  <remote-file> **config**

The target filename **config** filters out the Control Port IP Address and Netmask so that the connection is maintained.

Note: It is possible to reset the unit by using an ftp **put** of any file to the EQ8096 target file **resetunit**.

Upgrading EQ8096 with Input and Output Option Cards

Chapter 9

Contents

9.1 Introduction 9-3
9.1.1 Responsibilities 9-3
9.1.2 Tools Required 9-3
9.1.3 Parts Required 9-3
9.2 Installing/Removing a 12QAM Output Card 9-3
9.2.1 Preparing the Unit 9-3
9.2.2 Installing an Output Card 9-4
9.2.3 Removing an Output Card 9-5
9.3 Replacing (Upgrading) an Input Card 9-7
9.3.1 Preparing the Unit 9-7
9.3.2 Store the Current Unit Configuration 9-7
9.3.3 Replace the Input Card 9-8
9.3.4 Restore Unit IP and Serial Number 9-9
9.3.5 Reconfigure the Unit 9-9

List of Figures

Figure 9.1 EMC Fingers 9-4
Figure 9.2 Locating the Output Card 9-5
Figure 9.3 Removing the Output Card 9-5
Figure 9.4 Inserting the Extraction Tool 9-6
Figure 9.5 Inserting both Extraction Tools 9-6
Figure 9.6 Extracting the Output Card 9-7
Figure 9.7 Status Page 9-8
Figure 9.8 Control Port Main Screen 9-8

List of Tables

Table 9.1 Parts Required 9-3

BLANK

9.1 Introduction

This document defines the procedures installing and removing Input and Output Option Cards.

9.1.1 Responsibilities

The operator should be capable to working to IPC-A-610 standards and follow precautions set down in P035 Handling and Protection of ESD product.

In case of problems please contact customer services.

9.1.2 Tools Required

The following tools are required for installation and removal:

2 x S14483 Card Extraction Tools

9.1.3 Parts Required

The procedures given in this chapter refer to installation and replacement of the parts listed in the following table

Table 9.1 Parts Required

Part Number	Qty	Description
EQ8096/HWO/12QAM	A/R	12QAM Output Card
EQ8096/HWO/IP-RJ45	A/R	Input Card with RJ-45 Connections
EQ8096/HWO/IP-SFP	A/R	Input Card with SFP Connections

9.2 Installing/Removing a 12QAM Output Card

When installing or removing the 12QAM Output Card from the EQ8096 Edge QAM, the following process should be used.

9.2.1 Preparing the Unit

Before installing an Output Card the EQ8096 should be prepared, as follows:

1. Refer to *Chapter 2, Installing the Equipment* for slot numbering and assignment information
2. Ensure the unit is disconnected from the AC or DC mains.
3. Maintain ESD precautions.

9.2.2 Installing an Output Card

The EQ8096 is fitted with individual blanking panels to slots (1-8). These must be removed before the Output Card(s) can be fitted.

To install the 12QAM Output Card:

1. Remove the two screws securing the blanking panel from the slot; retain screws and blanking panel for later use.
2. Remove the new 12QAM Output Cards from the ESD bag.
3. Check the three heat sinks are securely fixed to the underside of the board.
4. Ensure all the EMC fingers are pointing towards the board surfaces before placing card into the runners on the chassis.

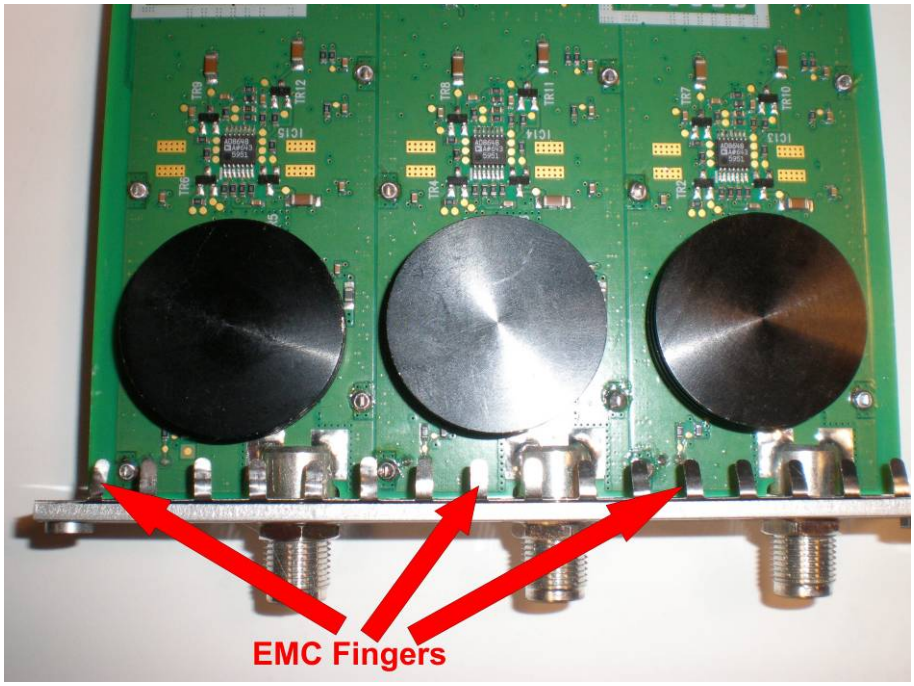

Figure 9.1 EMC Fingers

5. Push the card into the unit so the connector locates being careful that the heat sinks or the EMC fingers do not foul on the entrance to the chassis. There is no need to use the Card Extraction tools for this process.

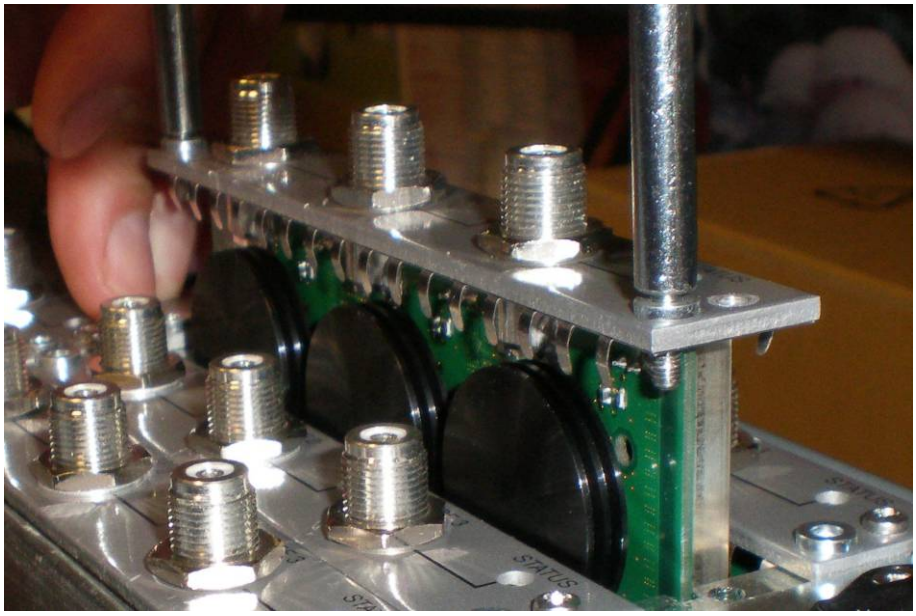

Figure 9.2 Locating the Output Card

6. Fit two screws removed from blanking panel and secure card.

9.2.3 Removing an Output Card

To remove the 12QAM Output Card:

1. Remove the two securing screws securing the card to the unit chassis, and retain for later use.

Figure 9.3 Removing the Output Card

2. Insert S14483 Card Extraction tools in each of the two M3 bushes below the securing screw hole

Figure 9.4 Inserting the Extraction Tool

3. Tighten each tool together. This will start to extract the card from the chassis

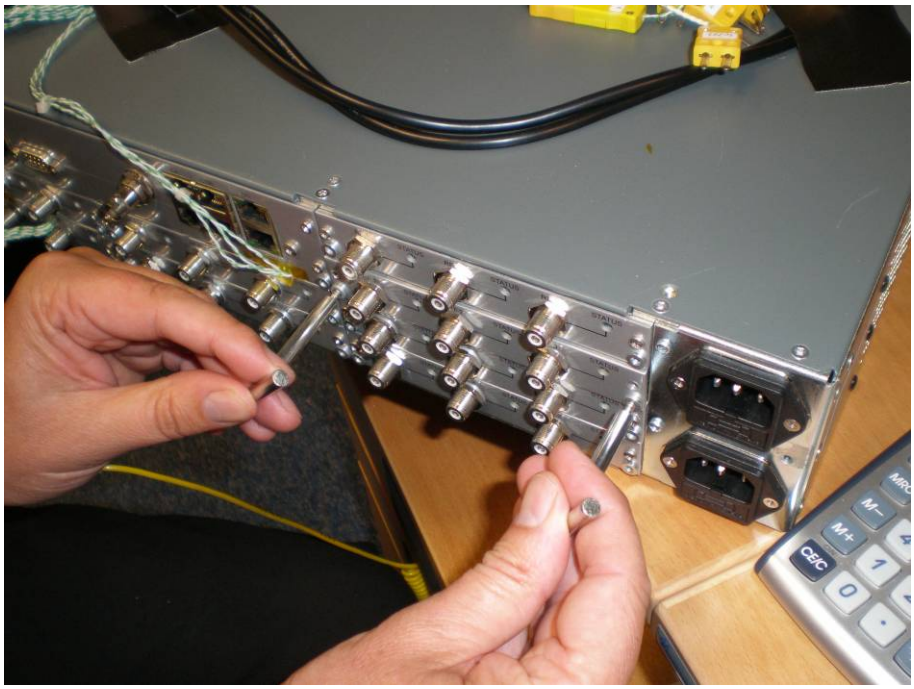

Figure 9.5 Inserting both Extraction Tools

4. Carefully remove the card ensuring that the heat sinks on the bottom of the card are not knocked.

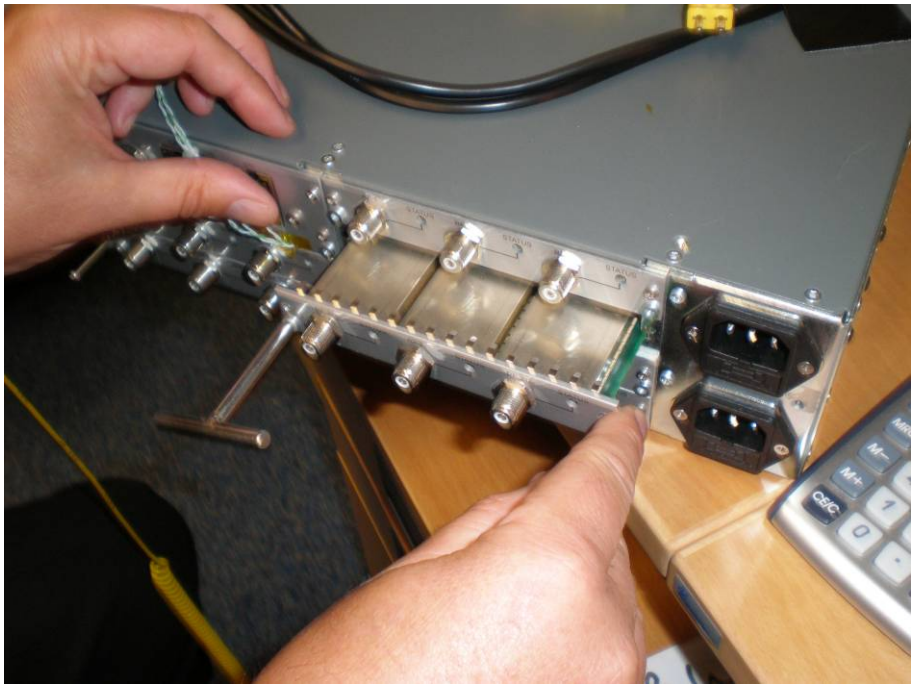

Figure 9.6 Extracting the Output Card

9.3 Replacing (Upgrading) an Input Card

9.3.1 Preparing the Unit

Before installing an Input Card the EQ8096 should be prepared, as follows:

1. Refer to *Chapter 2, Installing the Equipment* for slot numbering and assignment information
2. Ensure the unit is disconnected from the AC or DC mains.
3. Maintain ESD precautions.

9.3.2 Store the Current Unit Configuration

Obtain the current unit configuration by obtaining the ‘config’ file held on the EQ8096’s Flash memory. To do this, perform the following steps:

1. From DOS or Windows ‘Run’, type ‘ftp <ip_address>’ where ‘ip_address’ is the normal Control IP address in use on the EQ8096.
2. Enter the username: ‘engineer’
3. Enter the password: ‘96QAM’ (case sensitive)
4. Type ‘get config config.xml’

5. After the transfer has successfully completed type ‘bye’ to exit the FTP session. The config.xml file will have been saved to the local directory the FTP was performed from.

Note: The unit’s IP address and Serial Number. You can obtain the Serial Number by navigating to the ‘Status’ page on the GUI

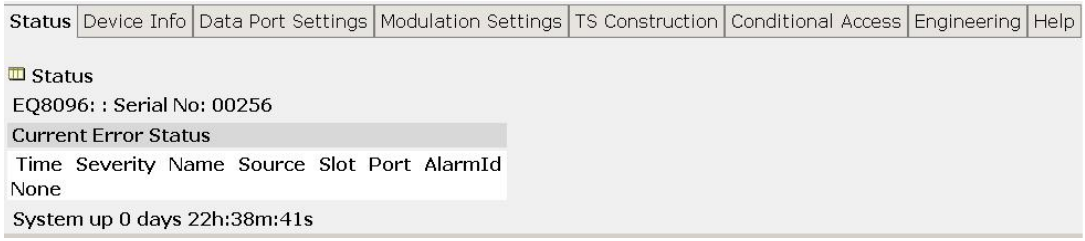

Figure 9.7 Status Page

Obtain the Main Control IP address by navigating to the Control port (Main) settings:

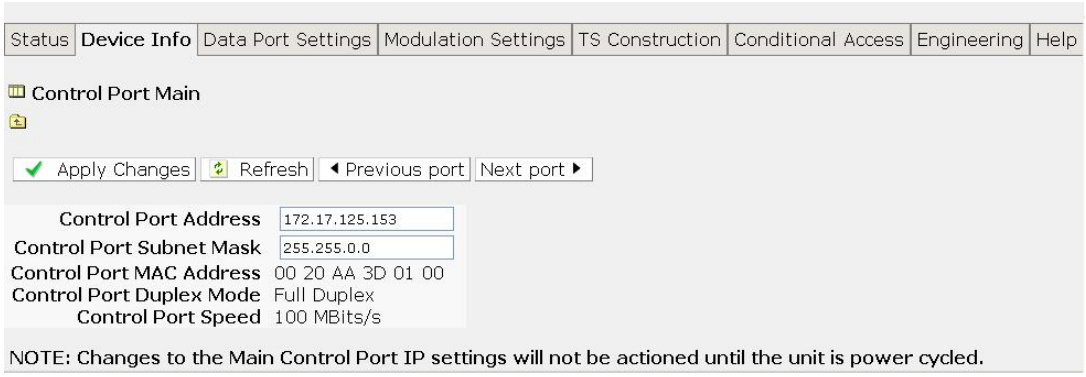

Figure 9.8 Control Port Main Screen

9.3.3 Replace the Input Card

To remove and replace the Input Card:

1. Power off the EQ8096 completely.
2. Maintain ESD precautions.
3. Remove the four screws securing the input card and retain for later use.
4. Insert S14483 Card Extraction tools in each of the two M3 bushes below the securing screw hole.
5. Tighten each tool together this will start to extract the card from the chassis.
6. Before fitting the replacement input card ensure all the EMC tabs are pointing towards the board surfaces before placing card into the runners on the chassis.
7. Push the card into the unit so the connector locates be careful that the EMC fingers do not foul on the entrance to the chassis.
8. Refit the four securing screws.

9.3.4 Restore Unit IP and Serial Number

The original Serial number, IP address and Configuration must be applied to the new Input card.

To restore this information:

1. Power on the EQ8096, making sure all the steps above have been performed correctly.
2. Using the RS-232 port on the rear panel of the input card, connect to a PC at 115,200 baud, 8, n, 1, n and ensure that you have the ‘Monitor>’ prompt.
3. Type ‘sn <original serial number>’ to set the unit’s serial number.
4. Type ‘ip3 <original IP address>’ to set the unit’s main control port address (alternatively the IP address can be set from the Front Panel as described in the Reference Guide).
5. Power cycle the unit.

9.3.5 Reconfigure the Unit

To verify that the cards are recognized by the unit:

1. Power up the unit and, using a web browser such as Internet Explorer, navigate to the EQ8096 home page by entering the IP address set in the previous step into the browser's address field and check that the GUI responds.
2. Check using the GUI that it recognises the fitted PCB cards and no faults are seen. Check also the IP address and Serial number are correctly reported, as per the instructions in 7.1

To reload the original configuration into Flash:

1. FTP into the unit as outlined in *section 7.1*, making sure that your source directory contains the ‘config.xml’ file obtained originally.
2. Type ‘put config.xml config’
3. After the transfer has completed type ‘bye’ to exit the FTP session.
4. Check that the unit has been correctly configured, as per the original unit configuration.

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EQ8096 M-CMTS System Test Specification

Chapter 10

Contents

10.1 General 10-3
10.1.1 Overview 10-3
10.1.2 Acronyms 10-3
10.2 Hardware - System Requirement 10-3
10.3 General Test Configuration 10-4
10.3.1 System Setup 10-5
10.3.2 M-CMTS Session Setup 10-5
10.3.3 CISCO Core Configurartion 10-10
10.3.4 DTI Card 10-11

List of Figures

Figure 10.1 Typical Test Configuration 10-4
Figure 10.2 Web GUI Home Page 10-5
Figure 10.3 DEPI Configuration WEB GUI 10-6
Figure 10.4 DEPI Input Session Setup 10-6
Figure 10.5 DEPI Session Setup 10-7
Figure 10.6 DEPI Session Enabled 10-7
Figure 10.7 DEPI Session Disabled 10-8
Figure 10.8 DEPI Session Reconfigured 10-8
Figure 10.9 Four Sessions, No Activity 10-9
Figure 10.10 Four Sessions, Receiving EQAM Data 10-9
Figure 10.11 DTI Client Locked 10-11

List of Tables

Table 10.1 LED Meanings 10-11

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10.1 General

10.1.1 Overview

This document describes the system test specification for on site test and verification of the EQ8096 DEPI-MPT functionality using a CISCO uBR10K Core.

10.1.2 Acronyms

DEPI: Downstream External Physical Interface

EQAM: Edge Quad Amplitude Modulator

10.2 Hardware - System Requirement

The following hardware devices are required for testing:

- **ERICSSON EQ8096 EQAM:** M-CMTS release version with DTI Client card fitted, this will be referred to simply as the “EQAM” throughout this document.
- **Cisco uBR10012 M-CMTS core:** The details of configuration and setup of the M-CMTS core are beyond the scope of this document. It is assumed an engineer is available to configure/control this device
- **Symmetricom TimeCreator 1000 DTI Server:** The configuration of the DTI Server is beyond the scope of this document. It is assumed an engineer is available to configure/control this device
- **Gigabit Ethernet Switch:** Any carrier grade Gigabit switch to act as a CIN (Converged Interconnect Network) between the M-CMTS core and EQ8096. Note: The uBR10012 M-CMTS core will likely have optical SPA outputs so the switch should provide at least one Gigabit optical interface to allow connectivity to the core.
- **DHCP Server:** This may be a PC setup with installed DHCP Server software or the CISCO Core. The DHCP Server will allocate IP addresses to the Cable Modems as part of the provisioning process. This could also be any DHCP server present on the CIN.
- **TFTP Server:** This may be a PC setup with installed DHCP Server software or the CISCO Core. The TFTP Server will allow a modem to download a configuration file.
- **Wideband cable modem(s):** This test setup has been proved with the following cable modems (Netwave MNG-2800, Netgear CM232 Pre-DOCSIS 3.0 Cable Modem, Scientific Atlanta XXX etc).

10.3 General Test Configuration

The following diagram shows the general set up required for EQAM testing with a Cisco uBR-10K core.

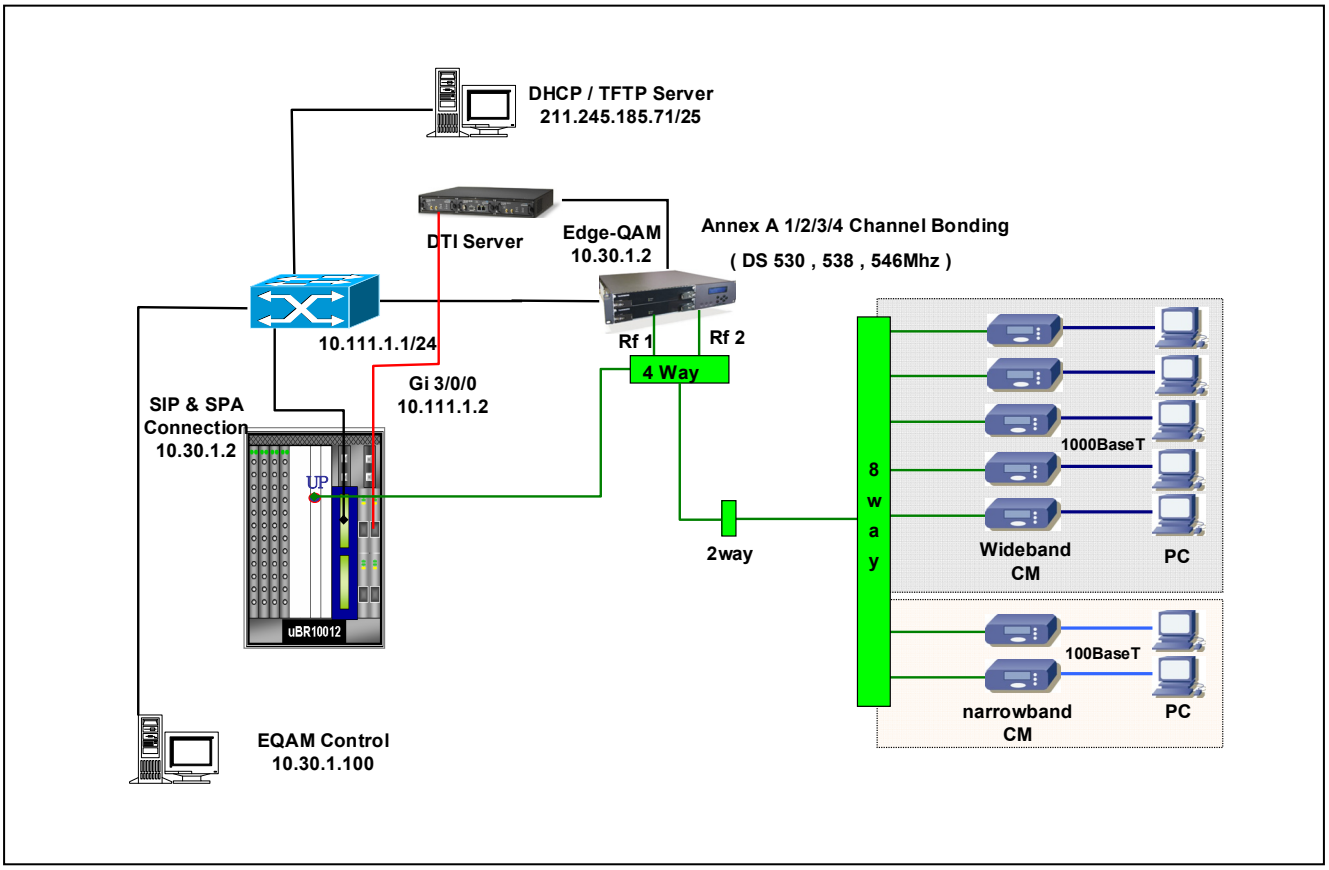

Figure 10.1 Typical Test Configuration

The diagram, basically consists of:

- **Carrier Grade Switch**
- **CISCO uBR10K Core:** With connection to EQAM via carrier grade switch and Up stream RF input
- **DHCP Server:** attached to carrier grade switch
- **EQAM:** connected to Carrier grade switch for down stream data/control
- **DTI Server:** supplying DTI clock to uBR10K and EQAM
- **EQAM Control:** PC running Web client
- **RF Network:** For downstream and upstream RF
- **Modems/PCs:** For end to end testing.

10.3.1 System Setup

A tester must perform the following set up when first installing the EQAM

- The EQ8096 must have the DTI client card installed. The DTI client can be either factory fitted or field upgradeable. If necessary, please refer to Chapter 9 of the EQ8096 Reference Guide for instructions regarding this field upgrade process.
- M-CMTS license enabled (please contact Ericsson Customer Support)
- Power up the EQAM
- After the EQAM has booted note the IP address/mask on the front panel and set up a PC to be in the same subnet.
- If you wish to change this IP Address/subnet mask you can do this via the front panel or alternatively connect the EQAM via a web client, You will be presented with the following Web GUI, *Figure 10.2:*

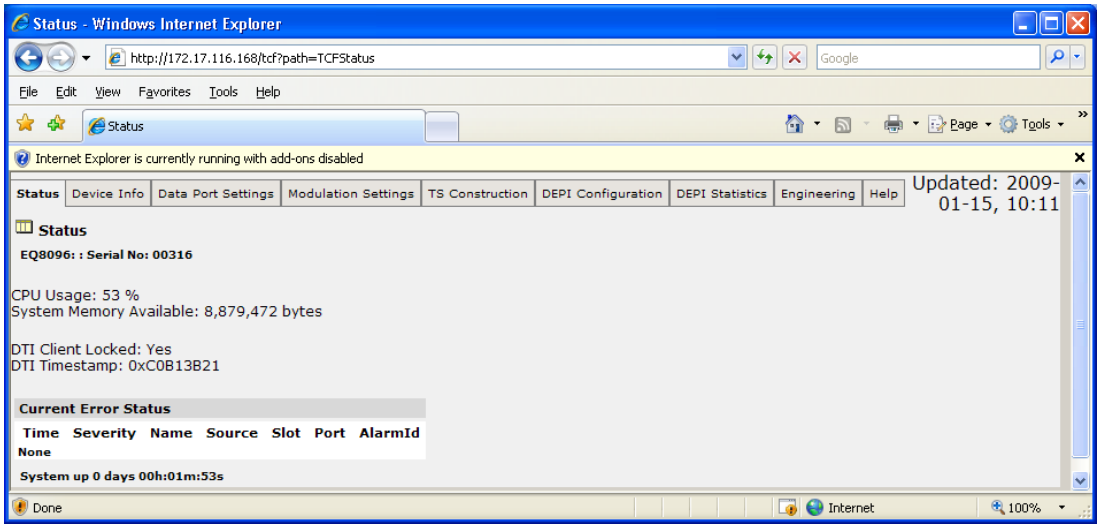
Status - Windows Internet Explorer
http://172.17.116.168/tcf?path=TCFStatus
File Edit View Favorites Tools Help
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 10:11
Status
EQ8096: : Serial No: 00316
CPU Usage: 53 %
System Memory Available: 8,879,472 bytes
DTI Client Locked: Yes
DTI Timestamp: 0xC0B13B21
Current Error Status
Time Severity Name Source Slot Port AlarmId
None
System up 0 days 00h:01m:53s
Done
Internet
100%

Figure 10.2 Web GUI Home Page

Note: If the DTI client card is not present the “DEPI Configuration” and “DEPI Statistics” tab will not be present and the DTI card information “DTI Client Locked: Yes” and “DTI Timestamp: XXXXXXX” under status will not be present.

10.3.2 M-CMTS Session Setup

The M-CMTS EQAM sessions are configured using the DEPI Configuration WEB GUI Page.

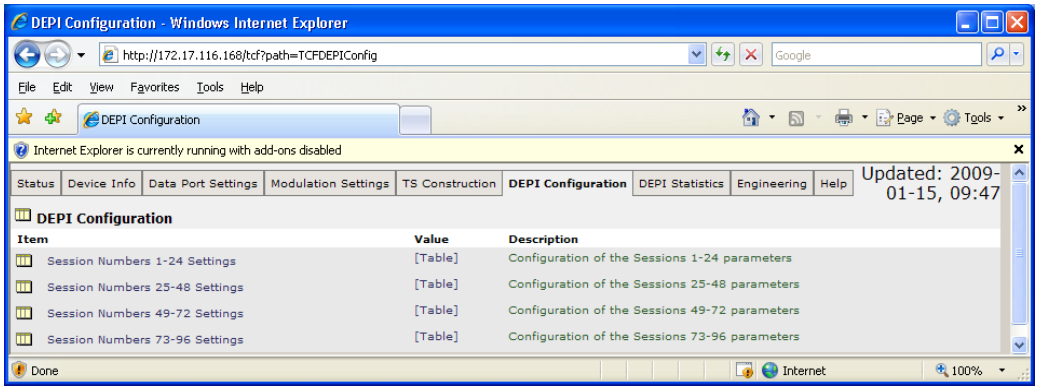
DEPI Configuration - Windows Internet Explorer
http://172.17.116.168/tcf?path=TCFDEPIConfig
File Edit View Favorites Tools Help
DEPI Configuration
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 09:47
DEPI Configuration
Item Value Description
Session Numbers 1-24 Settings [Table] Configuration of the Sessions 1-24 parameters
Session Numbers 25-48 Settings [Table] Configuration of the Sessions 25-48 parameters
Session Numbers 49-72 Settings [Table] Configuration of the Sessions 49-72 parameters
Session Numbers 73-96 Settings [Table] Configuration of the Sessions 73-96 parameters
Done
Internet
100%

Figure 10.3 DEPI Configuration WEB GUI

Note: There is one configuration page per 24 DEPI sessions. This is to make the web GUI more readable.

Any input card GBe input can be routed to any Output Card/Spigot/QAM Channel, i.e. any session can be set up for any stream through the EQAM, it is up to the user to manage this.

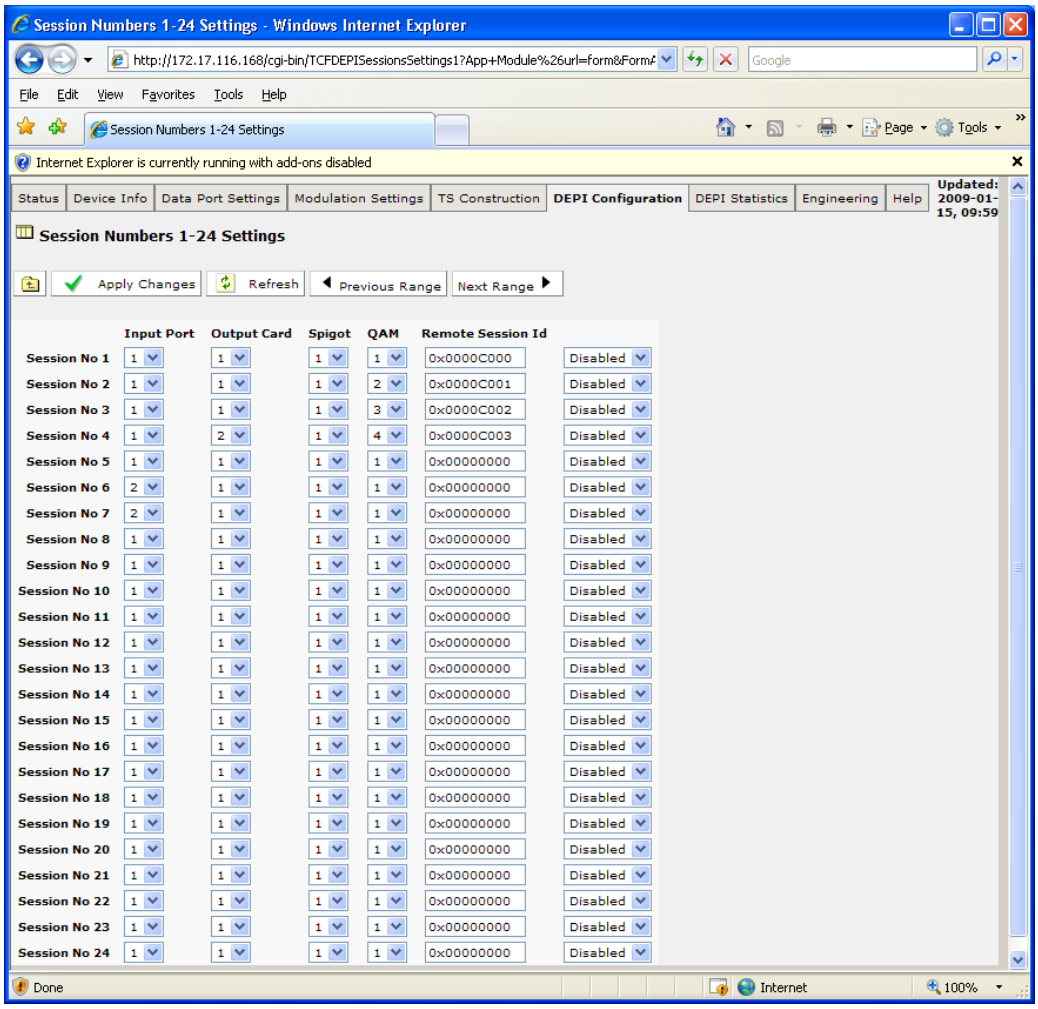
Session Numbers 1-24 Settings - Windows Internet Explorer
File Edit View Favorites Tools Help
Session Numbers 1-24 Settings
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 09:59
Session Numbers 1-24 Settings
Apply Changes Refresh Previous Range Next Range
Input Port Output Card Spigot QAM Remote Session Id
Session No 1 1 1 1 1 0x0000C000 Disabled
Session No 2 1 1 1 2 0x0000C001 Disabled
Session No 3 1 1 1 3 0x0000C002 Disabled
Session No 4 1 2 1 4 0x0000C003 Disabled
Session No 5 1 1 1 1 0x00000000 Disabled
Session No 6 2 1 1 1 0x00000000 Disabled
Session No 7 2 1 1 1 0x00000000 Disabled
Session No 8 1 1 1 1 0x00000000 Disabled
Session No 9 1 1 1 1 0x00000000 Disabled
Session No 10 1 1 1 1 0x00000000 Disabled
Session No 11 1 1 1 1 0x00000000 Disabled
Session No 12 1 1 1 1 0x00000000 Disabled
Session No 13 1 1 1 1 0x00000000 Disabled
Session No 14 1 1 1 1 0x00000000 Disabled
Session No 15 1 1 1 1 0x00000000 Disabled
Session No 16 1 1 1 1 0x00000000 Disabled
Session No 17 1 1 1 1 0x00000000 Disabled
Session No 18 1 1 1 1 0x00000000 Disabled
Session No 19 1 1 1 1 0x00000000 Disabled
Session No 20 1 1 1 1 0x00000000 Disabled
Session No 21 1 1 1 1 0x00000000 Disabled
Session No 22 1 1 1 1 0x00000000 Disabled
Session No 23 1 1 1 1 0x00000000 Disabled
Session No 24 1 1 1 1 0x00000000 Disabled
Done
Internet
100%

Figure 10.4 DEPI Input Session Setup

Select the output card/Spigot/QAM you wish to enable the session on, e.g. in our example we enable Input Card Port 2 which is routed to Output Card 1, Spigot 2, Qam channel 1. The Remote session id is supplied by the Core engineer and corresponds to the “depi-remote-id” set up in the core “controller Modular-cable” set up.

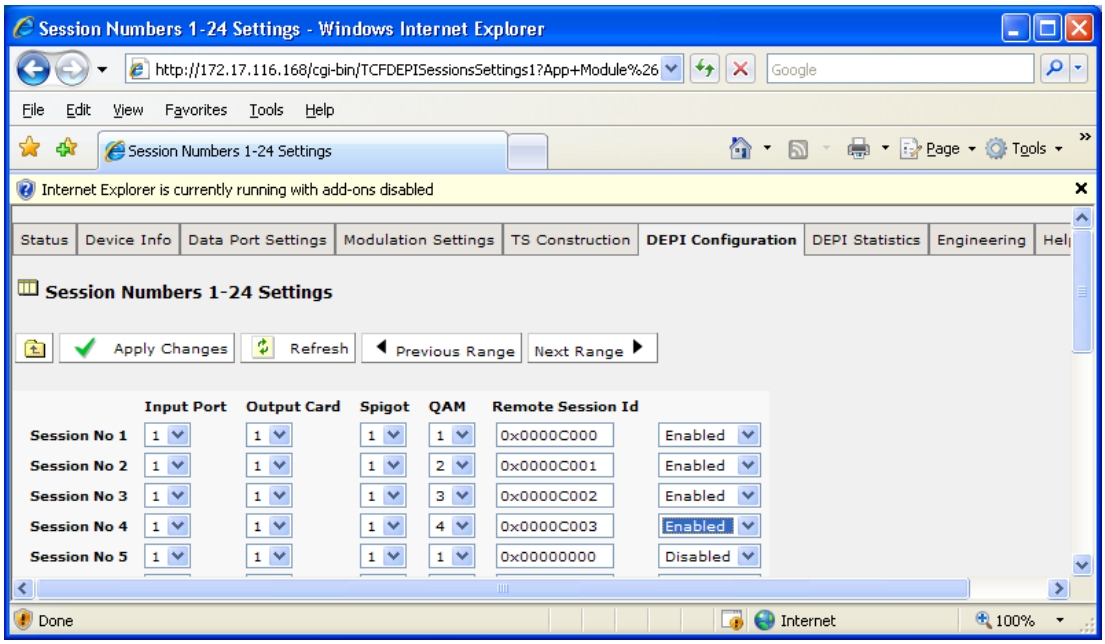
Session Numbers 1-24 Settings - Windows Internet Explorer
http://172.17.116.168/cgi-bin/TCFDEPISessionsSettings1?App+Module%26
File Edit View Favorites Tools Help
Session Numbers 1-24 Settings
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering
Session Numbers 1-24 Settings
Apply Changes Refresh Previous Range Next Range
Input Port Output Card Spigot QAM Remote Session Id
Session No 1 1 1 1 1 0x0000C000 Enabled
Session No 2 1 1 1 2 0x0000C001 Enabled
Session No 3 1 1 1 3 0x0000C002 Enabled
Session No 4 1 1 1 4 0x0000C003 Enabled
Session No 5 1 1 1 1 0x00000000 Disabled
Done
Internet
100%

Figure 10.5DEPI Session Setup

Then select “Apply Changes”. The enabled session will be grayed out and cannot now be changed until they are disabled, e.g.:

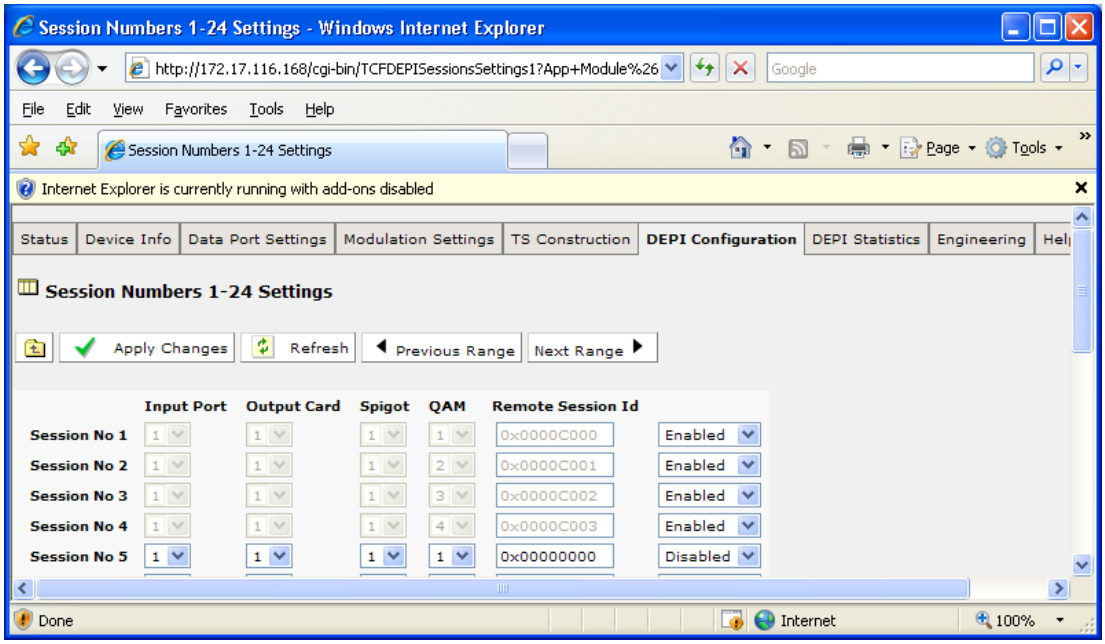
Session Numbers 1-24 Settings - Windows Internet Explorer
http://172.17.116.168/cgi-bin/TCFDEPISessionsSettings1?App+Module%26
File Edit View Favorites Tools Help
Session Numbers 1-24 Settings
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering
Session Numbers 1-24 Settings
Apply Changes Refresh Previous Range Next Range
Input Port Output Card Spigot QAM Remote Session Id
Session No 1 1 1 1 1 0x0000C000 Enabled
Session No 2 1 1 1 2 0x0000C001 Enabled
Session No 3 1 1 1 3 0x0000C002 Enabled
Session No 4 1 1 1 4 0x0000C003 Enabled
Session No 5 1 1 1 1 0x00000000 Disabled
Done
Internet
100%

Figure 10.6DEPI Session Enabled

If there is a problem enabling a channel then the selection will not change to grey and will still say “Disabled”.

To disable a session, select “disabled” then “Apply changes”, e.g. to disable session 4.

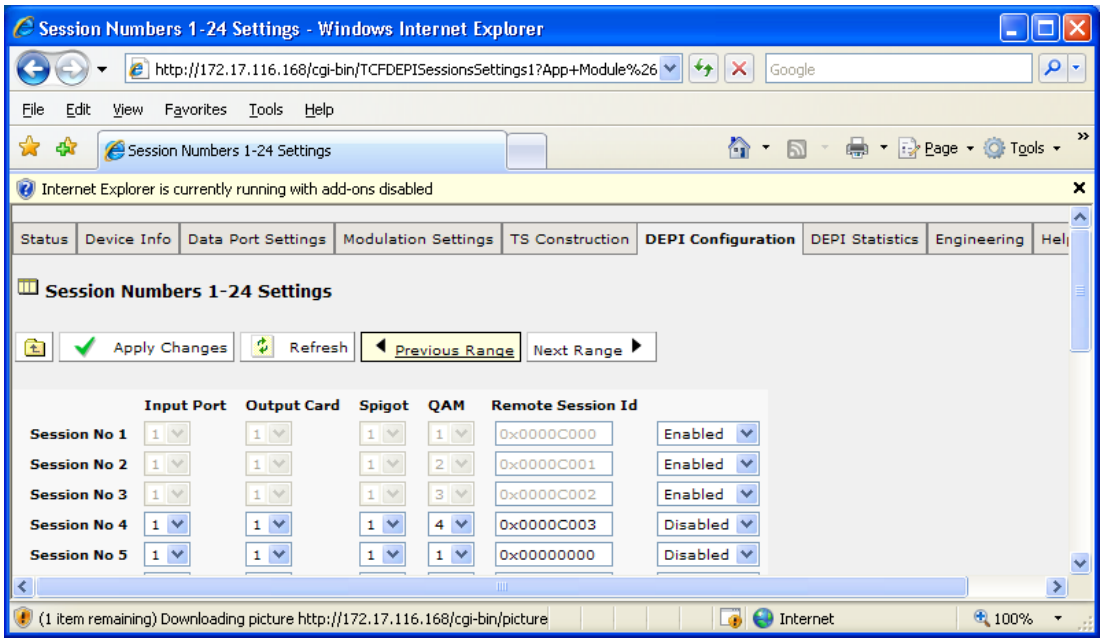
Session Numbers 1-24 Settings - Windows Internet Explorer
http://172.17.116.168/cgi-bin/TCFDEPISessionsSettings1?App+Module%26
File Edit View Favorites Tools Help
Session Numbers 1-24 Settings
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering
Session Numbers 1-24 Settings
Apply Changes Refresh Previous Range Next Range
Input Port Output Card Spigot QAM Remote Session Id
Session No 1 1 1 1 1 0x0000C000 Enabled
Session No 2 1 1 1 2 0x0000C001 Enabled
Session No 3 1 1 1 3 0x0000C002 Enabled
Session No 4 1 1 1 4 0x0000C003 Disabled
Session No 5 1 1 1 1 0x00000000 Disabled
(1 item remaining) Downloading picture http://172.17.116.168/cgi-bin/picture
Internet
100%

Figure 10.7 DEPI Session Disabled

Similarly, a session can be set up on Input Card Port 1, Output Card 2, Spigot 1, QAM 1.

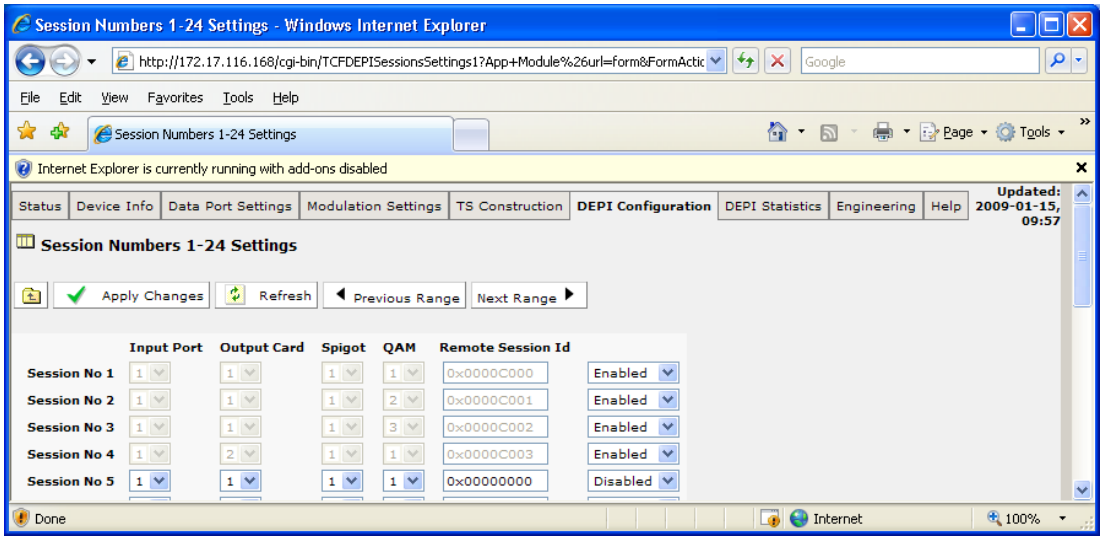
Session Numbers 1-24 Settings - Windows Internet Explorer
http://172.17.116.168/cgi-bin/TCFDEPISessionsSettings1?App+Module%26url=form8FormActic
File Edit View Favorites Tools Help
Session Numbers 1-24 Settings
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 09:57
Session Numbers 1-24 Settings
Apply Changes Refresh Previous Range Next Range
Input Port Output Card Spigot QAM Remote Session Id
Session No 1 1 1 1 1 0x0000C000 Enabled
Session No 2 1 1 1 2 0x0000C001 Enabled
Session No 3 1 1 1 3 0x0000C002 Enabled
Session No 4 1 2 1 1 0x0000C003 Enabled
Session No 5 1 1 1 1 0x00000000 Disabled
Done
Internet
100%

Figure 10.8 DEPI Session Reconfigured

This process can be repeated for any Inputs Card port.

Note: Please ensure you disable a session before changing the Input/Output Card/Spigot/QAM configuration.

When the DEPI sessions have been configured with the correct set up and the core is running you should see activity in the “DEPI Statistics” Web GUI page, e.g.:

Here we have 4 sessions set up but no activity:

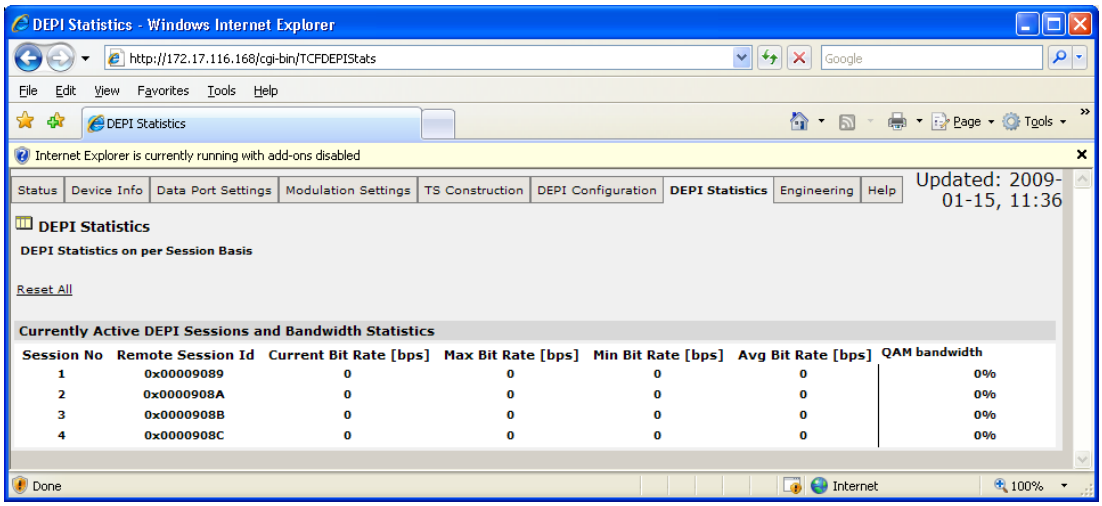
DEPI Statistics - Windows Internet Explorer
http://172.17.116.168/cgi-bin/TCFDEPIStats
File Edit View Favorites Tools Help
DEPI Statistics
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 11:36
DEPI Statistics
DEPI Statistics on per Session Basis
Reset All
Currently Active DEPI Sessions and Bandwidth Statistics
Session No | Remote Session Id | Current Bit Rate [bps] | Max Bit Rate [bps] | Min Bit Rate [bps] | Avg Bit Rate [bps] | QAM bandwidth
1 | 0x00009089 | 0 | 0 | 0 | 0 | 0%
2 | 0x0000908A | 0 | 0 | 0 | 0 | 0%
3 | 0x0000908B | 0 | 0 | 0 | 0 | 0%
4 | 0x0000908C | 0 | 0 | 0 | 0 | 0%
Done
Internet
100%

Figure 10.9 Four Sessions, No Activity

Here we have 4 sessions set up but this time the EQAM is receiving data from the EQAM:

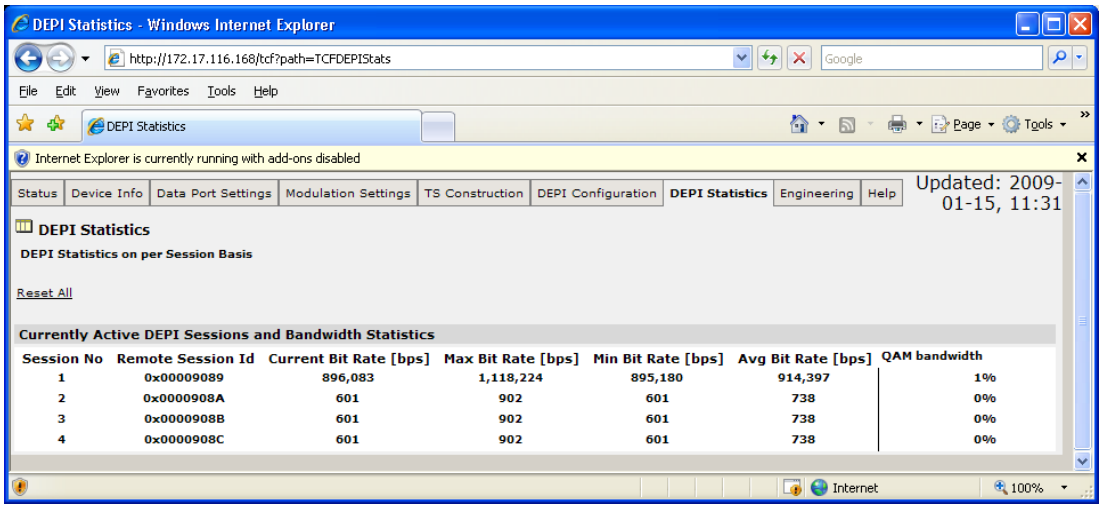
DEPI Statistics - Windows Internet Explorer
http://172.17.116.168/tcf?path=TCFDEPIStats
File Edit View Favorites Tools Help
DEPI Statistics
Internet Explorer is currently running with add-ons disabled
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Updated: 2009-01-15, 11:31
DEPI Statistics
DEPI Statistics on per Session Basis
Reset All
Currently Active DEPI Sessions and Bandwidth Statistics
Session No | Remote Session Id | Current Bit Rate [bps] | Max Bit Rate [bps] | Min Bit Rate [bps] | Avg Bit Rate [bps] | QAM bandwidth
1 | 0x00009089 | 896,083 | 1,118,224 | 895,180 | 914,397 | 1%
2 | 0x0000908A | 601 | 902 | 601 | 738 | 0%
3 | 0x0000908B | 601 | 902 | 601 | 738 | 0%
4 | 0x0000908C | 601 | 902 | 601 | 738 | 0%
Internet
100%

Figure 10.10 Four Sessions, Receiving EQAM Data

If you have configured your system and see no activity on this page then you likely have a configuration problem.

Note: The stats page refreshes periodically. The stats can be reset by selection the “Reset All” selection on the Web GUI page. The average bit rate is a running bit rate, measured from when the box is started or from when the last time the stats were reset.

10.3.3 CISCO Core Configurartion

The “Remote Session Id” returned to the DEPI Configuration WEB GUI page whenever a session is set up, see *Figure 10.6*, is very important, it identifies this QAM channel to the CISCO Core. This value must be given to the CISCO test engineer so he can set up the core with it.

The CISCO core engineer uses this value as the “depi-remote-id “ when setting up the core.

The CISCO core is set up with commands similar to:

1. 4 RF channels are defined (from rf-channel 0 to 3), the goal being to set up 4 channel bonding group.

   controller Modular-Cable 1/0/0
   ip-address 10.1.1.1
   modular-host subslot 5/0
   rf-channel 0 cable downstream channel-id 24
   rf-channel 0 frequency **111000000** annex A modulation 256qam interleave 12
   rf-channel 0 ip-address **10.30.1.1** mac-address **0020.AA3F.013C** depi-remote-id **49152**
   rf-channel 1 cable downstream channel-id 25
   rf-channel 1 frequency 119000000 annex A modulation 256qam interleave 12
   rf-channel 1 ip-address 10.30.1.1 mac-address 0020.AA3F.013C depi-remote-id 49153
   rf-channel 2 cable downstream channel-id 26
   rf-channel 2 frequency 127000000 annex A modulation 256qam interleave 12
   rf-channel 2 ip-address 10.30.1.1 mac-address 0020.AA3F.013C depi-remote-id 49154
   rf-channel 3 cable downstream channel-id 27
   rf-channel 3 frequency 135000000 annex A modulation 256qam interleave 12
   rf-channel 3 ip-address 10.30.1.1 mac-address 0020.AA3F.013C depi-remote-id 49155

   Note: An example of the parameters which must correspond to the EQAM are in bold above.

2. 4 RF channels are defined in this bonding group that is represented by the wideband-cable interface.

   interface Wideband-Cable1/0/0:0
   no ip address
   cable bundle 1
   cable bonding-group-id 1
   cable dynamic-bw-sharing
   cable rf-channel 0 bandwidth-percent 80 remaining ratio 100
   cable rf-channel 1
   cable rf-channel 2
   cable rf-channel 3

When the core is set up correctly you have enabled the QAM sessions, as above, then your test modems should lock/bond.

10.3.4 DTI Card

After the system is booted and configured ensure the DTI client card is in Sync by checking the WEB GUI status page or the LEDs on the back of the chassis before testing, e.g.:

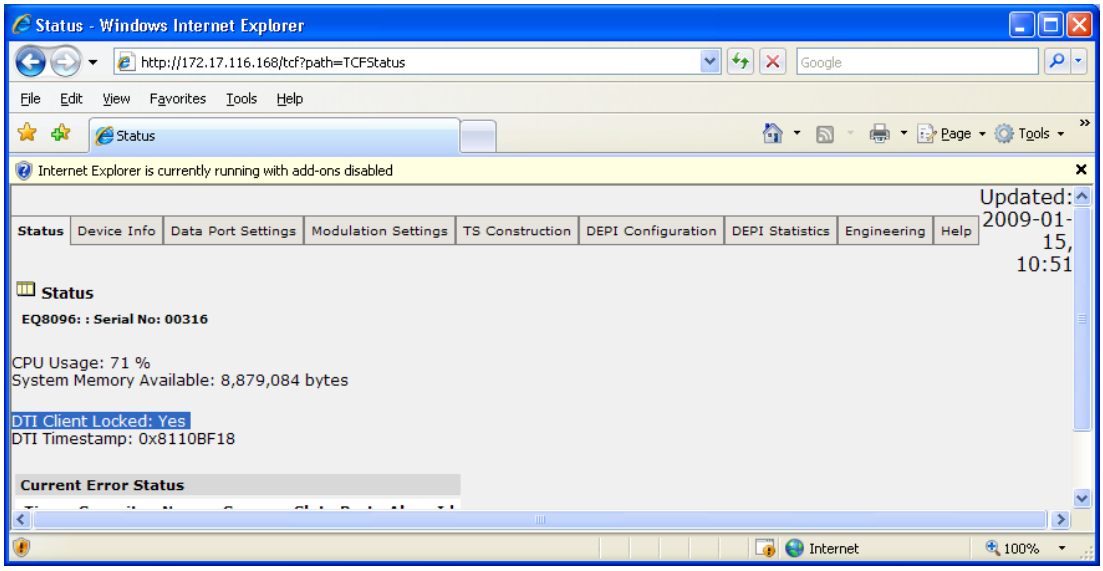
Status - Windows Internet Explorer
http://172.17.116.168/tcf?path=TCFStatus
File Edit View Favorites Tools Help
Internet Explorer is currently running with add-ons disabled
Updated: 2009-01-15, 10:51
Status Device Info Data Port Settings Modulation Settings TS Construction DEPI Configuration DEPI Statistics Engineering Help
Status
EQ8096: : Serial No: 00316
CPU Usage: 71 %
System Memory Available: 8,879,084 bytes
DTI Client Locked: Yes
DTI Timestamp: 0x8110BF18
Current Error Status
Internet
100%

Figure 10.11 DTI Client Locked

When the DTI card is in SYNC the status page reports “DTI Client Locked: Yes”.

Also, the LEDs on the DTI input port have the following meaning:

Table 10.1 LED Meanings

DTI LED Color/Position	Meaning
Both LEDs extinguished	No DTI Input
Amber/Right	DTI Locking in progress
Green/Left	DTI Lock achieved

BLANK

Glossary

Annex A

The following list covers most of the abbreviations, acronyms and terms as used in Ericsson Manuals, User and Reference Guides. Not all terms may be included in this Reference Guide.

µm	Micrometer (former name - micron): a unit of length equal to one millionth (10-6) of a meter.
1000BaseT	The term for the Electrical Gigabit Ethernet interface. This is the most common interface for Gigabit Ethernet. Most Gigabit-enabled PCs and equipment use this interface.
3:2 pull-down	A technique used when converting film material (which operates at 24 pictures per second) to 525-line video (operating at 30 pictures per second).
4:2:0	Digital video coding method in which the color difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the color difference signals are sampled on all lines at half the luminance rate.
422P@ML	422 Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 50 Mbps over various mediums. Used for Contribution and Distribution applications.
5B6B	5 Binary Bits Encoded to 6 Binary Bits: Block code.
ADPCM	Adaptive Differential Pulse Code Modulation: An advanced PCM technique that converts analogue sound into digital data and vice versa. Instead of coding an absolute measurement at each sample point, it codes the difference between samples and can dynamically switch the coding scale to compensate for variations in amplitude and frequency.
ACC	Authorization Control Computer.
ADT	Audio, Data And Teletext.
AFC	Automatic Frequency Control.
AFS	Automation File Server.
AGC	Automatic Gain Control.

AMOL I and II	Automatic Measure of Line-ups I and II: Used by automated equipment to measure programme-viewing ratings.
ARP	Address Resolution Protocol. A protocol used to "resolve" IP addresses into underlying Ethernet MAC addresses.
ASI	Asynchronous Serial Interface.
ASIC	Application-Specific Integrated Circuit: A customized chip designed to perform a specific function.
Async	Asynchronous.
ATM	Asynchronous Transfer Mode: A connection orientated, cell based, data transport technology designed for Broadband ISDN (B-ISDN). It provides a circuit-switched bandwidth-on-demand carrier system, with the flexibility of packet switching. It offers low end-to-end delays and (negotiable on call set up) Quality of Service guarantees. Asynchronous refers to the sporadic nature of the data being transmitted. Cells are transmitted only when data is to be sent, therefore the time interval between cells varies according to the availability of data.
ATSC	Advanced Television Standards Committee: An organization founded in 1983 to research and develop a digital TV standard for the U.S.A. In late 1996, the FCC adopted the ATSC standard, the digital counterpart of the NTSC standard.
B3ZS	Bipolar with Three Zero Substitution: A method of eliminating long zero strings in a transmission. It is used to ensure a sufficient number of transitions to maintain system synchronization when the user data stream contains an insufficient number of 1s to do so. B3ZS is the North American equivalent of the European HDB3.
Backward Compatibility	Refers to hardware or software that is compatible with earlier versions.
BAT	Bouquet Association Table: Part of the service information data. The BAT provides information about bouquets. It gives the name of the bouquet and a list of associated services.
baud rate	The rate of transfer of digital data when the data comprises information symbols that may consist of a number of possible states. Equivalent to bit rate when the symbols only have two states (1 and 0). Measured in Baud.
BER	Bit Error Rate: A measure of transmission quality. The rate at which errors occur in the transmission of data bits over a link. It is generally shown as a negative exponent, (e.g., 10-7 means that 1 in 10,000,000 bits are in error).
BISS	Basic Interoperable Scrambling System: Non-proprietary encryption from EBU (Tech3290).
Bit rate	The rate of transfer of digital data when the data comprises two logic states, 1 and 0. Measured in bit/s.
Block; Pixel Block	An 8-row by 8-column matrix of luminance sample values, or 64 DCT coefficients (source, quantized, or de-quantized).

Bouquet	A collection of services (TV, radio, and data, or any combination of the three) grouped and sold together, and identified in the SI as a group. A single service may be in several bouquets.
B-Picture; B-Frame	Bi-directionally Predictive Coded Picture/Frame: A picture that is coded using motion-compensated prediction from previous I or P frames (forward prediction) and/or future I or P frames (backward prediction). B frames are not used in any prediction.
BPSK	Binary Phase Shift Keying: A data modulation technique.
Buffer	A memory store used to provide a consistent rate of data flow.
BW	Bandwidth: The transmission capacity of an electronic line such as (among others) a communications network, computer bus, or broadcast link. It is expressed in bits per second, bytes per second or in Hertz (cycles per second). When expressed in Hertz, the frequency may be a greater number than the actual bits per second, because the bandwidth is the difference between the lowest and highest frequencies transmitted. High bandwidth allows fast transmission or high-volume transmission.
Byte-mode	Each byte is delivered separately in the ASI transport stream, with stuffing data added between the Bytes to increase the data rate to 270 Mbps. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
CA	Conditional Access: The technology used to control the access to viewing services to authorized subscribers through the transmission of encrypted signals and the programmable regulation of their decryption by a system such as viewing cards.
CAT	Conditional Access Table: Part of the MPEG-2 Program Specific Information (PSI) data. Mandatory for MPEG-2 compliance if CA is in use.
C-Band	The portion of the electromagnetic spectrum, which spans the frequency range of approximately 4 GHz to 6 GHz. Used by communications satellites. Preferred in tropical climates because it is not susceptible to fading.
CCIR	See: ITU-R.
CCITT	See: ITU-T.
Channel	a narrow range of frequencies, part of a frequency band, for the transmission of radio and television signals without interference from other channels. In the case of OFDM, a large number of carriers spaced apart at precise frequencies are allocated to a channel.
Channel Coding	A way of encoding data in a communications channel that adds patterns of redundancy into the transmission path in order to improve the error rate. Such methods are widely used in wireless communications.

Chrominance The color part of a TV picture signal, relating to the hue and saturation but not to the luminance (brightness) of the signal. In a composite-coded color system, the color information (chrominance, often referred to as chroma) is modulated onto a high frequency carrier and added to the monochrome-format video signal carrying the luminance (Y). In a component-coded color system, the two color-difference signals (R-Y)(B-Y) usually referred to as C_RC_B (digital) or P_RP_B (analogue), are used to convey color information. When C_RC_B (P_RP_B) is added to the luminance (Y), the complete picture information is conveyed as YC_RC_B (YP_RP_B).

Closed Captioning A TV picture subtitling system used with 525-line analogue transmissions.

CODE Create Once Distribute Everywhere.

Codec The combination of an En**co**der and a complementary **Dec**oder located respectively at the input and output of a transmission path.

COFDM Coded OFDM: COFDM adds forward error correction to the OFDM transmission consisting of Reed-Solomon (RS) coding followed by convolutional coding to add extra bits to the transmitted signal. This allows a large number of errors at the receive end to be corrected by convolutional (Viterbi) decoding followed by RS decoding.

Composite CVBS Video Signal, 1 $V_{pk\text{-}pk}$

Compression Reduction in the number of bits used to represent the same information. For the purposes of a broadcast system, it is the process of reducing digital picture information by discarding redundant portions of information that are not required when reconstituting the picture to produce viewing clarity. Compression allows a higher bite-rate to be transmitted through a given bandwidth.

Compression System Responsible for compressing and multiplexing the video / audio / data bitstreams, together with the authorization stream. The multiplexed data stream is then ready for transmission.

C_RC_B Digital Color difference signals. These signals, in combination with the luminance signal (Y), define the color and brightness of each picture element (pixel) on a TV line. See: Chrominance

CRC Cyclic Redundancy Check: A mathematical algorithm that computes a numerical value based on the bits in a block of data. This number is transmitted with the data and the receiver uses this information and the same algorithm to ensure the accurate delivery of data by comparing the results of algorithm and the number received. If a mismatch occurs, an error in transmission is presumed.

CVBS Color Video Black Sync Signal

dB Decibels: A ratio of one quantity to another using logarithmic scales to give results related to human aural or visual perception. dB is a ratio whereas dBm, for example, is an absolute value, quoted as a ratio to a fixed point of 0 dBm. 0 dBm is 1 mW at 1 kHz terminated in 600Ω. 0 dBmV is 1 mV terminated in 75Ω.

DCE	Data Communications Equipment: Typically a modem. It establishes, maintains and terminates a session on a network but in itself is not the source (originator) or destination (end receiving unit) of signals (e.g. a computer, see DTE). A DCE device may also convert signals to comply with the transmission path (network) format.
DCT	Discrete Cosine Transform: A technique for expressing a waveform as a weighted sum of cosines. Raw video data is not readily compressible. DCT is not in itself a compression technique but is used to process the video data so that it is compressible by an encoder. DCT processes the picture on an 8x8-pixel block basis, converting the data from an uncompressible X Y form (as displayed by an oscilloscope) to a compressible frequency domain form (as displayed by a spectrum analyzer). Can be forward DCT or inverse DCT.
DDS	Direct Digital Synthesiser.
Decoder	The unit containing the electronic circuitry necessary to decode encrypted signals. Some Decoders are separate from the receiver but in satellite TV broadcasting, the term is often used interchangeably as a name for an Integrated Receiver Decoder (IRD). The term IRD, or IRD / Decoder, is usually associated with satellite TV broadcasting while Cable systems are based on Converters or on Set-Top Boxes / Converters.
Decoding Time stamp	A field that may be present in a PES packet header that indicates the time that an access unit is to be decoded in the system target Decoder.
DENG	Digital Electronic News Gathering
DID	Data Identifier.
Differential Coding	Method of coding using the difference between the value of a sample and a predicted value.
DiffServ	Differentiated Services. A mechanism used on layer 3 - e.g. the IP layer - to differentiate between traffic of various types. DiffServ is based on the ToS field and provides a mechanism for the network to give e.g. video traffic higher priority than other traffic (for example Internet traffic).
DIL	Dual In Line: The most common type of package for small and medium scale integrated circuits. The pins hang vertically from the two long sides of the rectangular package, spaced at intervals of 0.1 inch.
DIN	Deutsches Institut für Normung: German Standards Institute.
Downlink	The part of the satellite communications circuit that extends from the satellite to an Earth station.
Downconvert	The process by which the frequency of a broadcast transport stream is shifted to a lower frequency range.
DPCM	Differential Pulse Code Modulation: An audio digitization technique that codes the difference between samples rather than coding an absolute measurement at each sample point.

DSNG	Digital Satellite News-Gathering.
DSP	Digital Signal Processor.
DTE	Data circuit Terminating Equipment: A communications device that originates (is the source) or is the end receiving unit (destination) of signals on a network. It is typically a terminal or computer.
DTH	Direct-To-Home. The term used to describe uninterrupted transmission from the satellite directly to the subscriber, that is, no intermediary cable or terrestrial network utilized.
DTMF	Dual-Tone MultiFrequency
DVB	Digital Video Broadcasting: A European project which has defined transmission standards for digital broadcasting systems using satellite (DVB-S), cable (DVB-C) and terrestrial (DVB-T) medium, created by the EP-DVB group and approved by the ITU. Specifies modulation, error correction, etc. (see EN 300 421 for satellite, EN 300 429 for cable and EN 300 744 for terrestrial).
DVB SI	Digital Video Broadcasting Service Information.
DVB-PI	DVB-Professional Interfaces: TTV Lan search shows – DVB Physical Interfaces
DWDM	Dense Wavelength Division Multiplexing. A mechanism to utilize existing fiber with even more bandwidth by adding extra signals using other wavelengths/colors
Earth	Technical Earth: Ensures that all equipment chassis within a rack are at the same potential, usually by connecting a wire between the Technical earth terminal and a suitable point on the rack. This is sometimes known as a Functional earth. Protective Earth: Used for electric shock protection. This is sometimes known as a safety earth.
EBU	European Broadcast Union.
ECM	Entitlement Control Message.
EDI	Ethernet Data Input
EIA	Electronics Industries Association (USA).
EIT	Event Information Table: Equipment: A component of the DVB-Service Information (SI) stream generated within an Encoder, containing information about events or programmes such as event name, start time, duration, etc. System: EIT (Present/Following) contains the name of the current and next event. It may include an optional descriptor (synopsis) giving brief details of content. EIT (Schedule) is used to produce a full EPG. The EIT is the only DVB-SI table, which can be encrypted.
Elementary Stream	A generic term for a coded bitstream, be it video, audio or other.
EMC	Electromagnetic Compatibility.
EMM	Entitlement Management Message.

Encryption	Encoding of a transmission to prevent access without the appropriate decryption equipment and authorization.
EPG	Electronic Programme Guide: On-screen programme listing using thumbnail pictures and/or text.
Ethernet	The most widely used local area network (LAN) defined by the IEEE as the 802.3 standard. Transmission speeds vary according to the configuration. Ethernet uses copper or fiber-optic cables.
ETS	European Telecommunications Standard.
ETSI	European Telecommunications Standards Institute.
FBAS	German for CVBS
FCC	Federal Communications Commission.
FDM	Frequency Division Multiplex: A common communication channel for a number of signals, each with its own allotted frequency.
FEC	Forward Error Correction: A method of catching errors in a transmission. The data is processed through an algorithm that adds extra bits and sends these with the transmitted data. The extra bits are then used at the receiving end to check the accuracy of the transmission and correct any errors.
FFT	Fast Fourier Transformation: A fast algorithm for performing a discrete Fourier transform.
FIFO	First In, First Out: A data structure or hardware buffer from which items are taken out in the same order they were put in. Also known as a shelf from the analogy with pushing items onto one end of a shelf so that they fall off the other. A FIFO is useful for buffering a stream of data between a sender and receiver that are not synchronized - i.e. they not sending and receiving at exactly the same rate.
FM	Frequency Modulation: Analogue modulation procedure
Footprint	The area of the Earth’s surface covered by a satellite’s downlink transmission. Also (generally) the area from which the satellite can receive uplink transmissions.
FTP	File Transfer Protocol: A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a Web site on a local machine, they are typically uploaded to the Web server, using FTP. Unlike e-mail programs in which graphics and program files have to be attached, FTP is designed to handle binary files directly and does not add the overhead of encoding and decoding the data.
G.703	The ITU-T standard which defines the physical and electrical characteristics of hierarchical digital interfaces.
GOP	Group of Pictures: MPEG video compression works more effectively by processing a number of video frames as a block. The Ericsson Encoder normally uses a 12 frame GOP; every twelfth frame is an I frame.

GUI	Graphical User Interface: The use of pictures rather than just words to represent the input and output of a program. A program with a GUI runs under a windowing system and has a screen interface capable of displaying graphics in the form of icons, drop-down menus and a movable pointer. The on-screen information is usually controlled / manipulated by a mouse or keyboard.
HDTV	High Definition Television.
HPA	High Power Amplifier: Used in the signal path to amplify the modulated and up-converted broadcast signal for feeding to the uplink antenna.
HSYNC	Horizontal (line) SYNCs.
HTTP	Hypertext Transfer Protocol. The fundamental protocol used on the Internet for transmission of WEB pages and other data between servers and PCs
HU	Height Unit
Hub	A device in a multi-point network at which branch nodes interconnect.
ICAM	Integrated Conditional Access Module: Embedded in the IRD and responsible for descrambling, plus packet filtering and reception. It also contains the physical interface to the subscriber's viewing card.
ICMP	Internet Control Message Protocol. ICMP messages, delivered in IP packets, are used for out-of-band messages related to network operation or mis-operation
IGMP	Internet Group Management Protocol. IGMP is a protocol used to manage multicasts on the Internet. For a host (receiver unit) to receive a multicast, it needs to transmit IGMP "join" messages on the right format. Three versions exist. IGMPv2 is common today but IGMPv3 is the next step**.**
IDU	Indoor unit
IEC	International Electrotechnical Committee.
IF	Intermediate Frequency: Usually refers to the 70 MHz or 140 MHz output of the Modulator in cable, satellite and terrestrial transmission applications.
Interframe Coding	Compression coding involving consecutive frames. When consecutive frames are compared, temporal redundancy is used to remove common elements (information) and arrive at difference information. MPEG-2 uses B and P frames, but since they are individually incomplete and relate to other adjacent frames, they cannot be edited independently.
Intraframe Coding	Compression coding involving a single frame. Redundant information is removed on a per frame basis. All other frames are ignored. Coding of a macroblock or picture that uses information only from that macroblock or picture. Exploits spatial redundancy by using DCT to produce I frames; these are independent frames and can be edited.

IP	Internet Protocol: The IP part of TCP/IP. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or sub-network. IP accepts packets from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a datagram to the layer 2 data link protocol. It may also break the packet into fragments to support the Maximum Transmission / Transfer Unit (MTU) of the network.
I-picture; I-frame	Intracoded Picture/Frame: A picture / frame, which is coded using purely intracoding with reference to no other field or frame information. The I frame is used as a reference for other compression methods.
IPPV	Impulse Pay Per View: One-time events, purchased at home (on impulse) using a prearranged SMS credit line.
IRD	Integrated Receiver Decoder: The Receiver with an internal MPEG Decoder, which is connected to the subscriber's TV. The IRD is responsible for receiving and de-multiplexing all signals. The unit receives the incoming signal and if CA is active, decodes the signal when provided with a control word by the viewing card. Domestic IRDs are also known as Set-Top Units or Set-Top Boxes.
IRE	Institute of Radio Engineers: No longer in existence but the name lives on as a unit of video amplitude measurement. This unit is 1% of the range between blanking a peak white for a standard amplitude signal.
ISDN	Integrated Services Digital Network: The basic ISDN service is BRI (Basic Rate Interface), which is made up of two 64 kbps B channels and one 16 kbps D channel (2B+D). If both channels are combined into one, called bonding, the total data rate becomes 128 kbps and is four and a half times the bandwidth of a V.34 modem (28.8 kbps). The ISDN high speed service is PRI (Primary Rate Interface). It provides 23 B channels and one 64 kbps D channel (23B+D), which is equivalent to the 24 channels of a T1 line. When several channels are bonded together, high data rates can be achieved. For example, it is common to bond six channels for quality videoconferencing at 384 kbps. In Europe, PRI includes 30 B channels and one D channel, equivalent to an E1 line.
ISO	International Standards Organisation.
ISOG	Inter-union Satellite Operations Group.
ITS	Insertion Test Signal: A suite of analogue test signals placed on lines in the VBI. Also known as VITS.
ITT	Invitation To Tender.
ITU-R	International Telecommunications Union - Radiocommunications Study Groups (was CCIR).
ITU-T	International Telecommunications Union - Telecommunications Standardization Sector (was CCITT).

JPEG Joint Photographic Experts Group: ISO/ITU standard for compressing still images. It has a high compression capability. Using discrete cosine transform, it provides user specified compression ratios up to around 100:1 (there is a trade-off between image quality and file size).

kbps 1000 bits per second.

Kbit 1024 bits, usually refers to memory capacity or allocation.

Ku-band The portion of the electromagnetic spectrum, which spans the frequency range of approximately 12 GHz to 14 GHz. Used by communications satellites. Preferred for DTH applications because this range of frequency is less susceptible to interference.

LAN Local Area Network: A network, which provides facilities for communications within a defined building or group of buildings in close proximity.

L-band The frequency band from 950 MHz to 2150 MHz, which is the normal input-frequency-range of a domestic IRD. The incoming signal from the satellite is down-converted to L-band by the LNB.

LED Light Emitting Diode.

LNB Low Noise Block Down-Converter: The component of a subscriber satellite transmission receiving dish which amplifies the incoming signal and down-converts it to a suitable frequency to input to the IRD (typically 950 MHz - 1600 MHz).

LO Local Oscillator.

lsb Least significant bit.

Luminance The television signal representing brightness, or the amount of light at any point in a picture. The Y in YC_RC_B.

LVDS Low Voltage Differential Signal: LVDS is a generic multi-purpose Interface standard for high speed / low power data transmission. It was standardized in ANSI/TIA/EIA-644-1995 Standard (aka RS-644).

Macroblock A 16x16-pixel area of the TV picture. Most processing within the MPEG domain takes place with macro blocks. These are converted to four 8x8 blocks using either frame DCT or field DCT. Four 8 x 8 blocks of luminance data and two (4:2:0 chrominance format), four (4:2:2) or eight (4:4:4) corresponding 8 x 8 blocks of chrominance data coming from a 16 x 16 section of the luminance component of the picture. Macroblock can be used to refer to the sample data and to the coded representation of the sample values and other data elements.

Mbps Million bits per second.

MCC Multiplex Control Computer: A component of a System 3000 compression system. The MCC sets up the configuration for the System 3000 Multiplexers under its control. The MCC controls both the main and backup Multiplexer for each transport stream.

MCPC Multiple Channels Per Carrier.

MEM	Multiplex Element Manager: A GUI-based control system, part of the range of Ericsson compression system control element products. The evolution *5*000 MEM holds a model of the system hardware. Using this model, it controls the individual system elements to configure the output multiplexes from the incoming elementary streams. The MEM monitors the equipment status and controls any redundancy switching.
Meta-data	Meta-data is descriptive data that is "tagged" to a movie or audio clip. Meta-data is essential for the broadcaster.
MMDS	Multichannel Microwave Distribution System: A terrestrial microwave direct-to-home broadcast transmission system.
Motion Compensation	The use of motion vectors to improve the efficiency of the prediction of sample values. The prediction uses motion vectors to provide offsets into the past and/or future reference frames or fields containing previously decoded sample values that are used to form the prediction error signal.
Motion Estimation	The process of estimating motion vectors in the encoding process.
Motion Vector	A two-dimensional vector used for motion compensation that provides an offset from the coordinate position in the current picture or field to the coordinates in a reference frame or field.
MP@ML	Main Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbps over various mediums.
MP@HL	Main Profile at High Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 80 Mbps over various mediums.
MPEG	Moving Pictures Experts Group: The name of the ISO/IEC working group which sets up the international standards for digital television source coding.
MPEG-2	Industry standard for video and audio source coding using compression and multiplexing techniques to minimize video signal bit rate in preparation for broadcasting. Specified in ISO/IEC 13818. The standard is split into layers and profiles defining bit rates and picture resolutions.
MPLS	Multi-protocol Label Switching. A Quality of Service mechanism for IP networks that allow IP packets to flow along a predefined path in a network, improving the reliability and robustness of the transmission.
MPTS	Multi-Program Transport Streams. Transport Streams that carry multiple TV/Radio services.
msb	Most significant bit.
Msymbol/s	(Msym/s) Mega (million) Symbols per second (10^6 Symbols per second).
Multiplex	A number of discrete data streams (typically 8 to 12), from encoders, that are compressed together in a single DVB compliant transport stream for delivery to a Modulator.

Multicast An IP mechanism that allows transmission of data to multiple receivers. A multicast can also have several transmit sources simultaneously. In video applications, multicast is typically used to distribute a video signal from a central source to multiple destinations.

MUSICAM Masking pattern adapted Universal Sub-band Integrated Coding And Multiplexing: An audio bit rate reduction system relying on sub-band coding and psychoacoustic masking.

Mux Multiplexer: Transmission Multiplexer: receives EMMs from the ACC, ECMs from the BCC, video/audio data from the encoders, and the SI stream from the SIC. It then multiplexes them all into a single DVB-compliant transport stream, and delivers the signal to the uplink after modulation.

The Multiplexer also contains the cipher card, which scrambles the services according to the control words supplied by the BCC.

Network In the context of broadcasting: a collection of MPEG-2 transport stream multiplexes transmitted on a single delivery system, for example, all digital channels on a specific cable system.

NICAM Near Instantaneously Companded Audio Multiplex: Official name is NICAM 728. Used for digital stereo sound broadcasting in the UK employing compression techniques to deliver very near CD quality audio. 728 refers to the bit rate in kbps.

NIT Network Information Table: Part of the service information data. The NIT provides information about the physical organization of each transport stream multiplex, and the characteristics of the network itself (such as the actual frequencies and modulation being used).

nm Nanometer: a unit of length equal to one thousand millionth (10^{-9}) of a meter.

NMS Network Management System. A system used to supervise elements in an IP network. When a device reports an alarm, the alarm will be collected by the NMS and reported to the operator. NMS systems typically collect valuable statistics information about the network performance and can warn the operator early.

NTSC National Television Systems Committee: The group, which developed analogue standards used in television broadcast systems in the United States. Also adopted in other countries (e.g. Mexico, Canada, Japan). This system uses 525 picture lines and a 59.97 Hz field frequency.

NVOD Near Video On-Demand: Method of offering multiple showings of movies or events. The showings are timed to start at set intervals, determined by the broadcaster. Each showing of a movie or event can be sold to subscribers separately.

NVRAM Non-volatile Random Access Memory: Memory devices (permitting random read / write access) that do not lose their information when power is removed. Stores the default configuration parameters set by the user.

ODU Outdoor Unit

OFDM Orthogonal Frequency Division Multiplex: A modulation technique used for digital TV transmission in Europe, Japan and Australia; more spectrally efficient than FDM. In OFDM, data is distributed over a large number of carriers spaced apart at precise frequencies. The carriers are arranged with overlapping sidebands in such a way that the signals can be received without adjacent channel interference.

OPPV Order ahead Pay Per View: An advance purchase of encrypted one-time events with an expiry date.

OSD On-screen display: Messages and graphics, typically originating from the SMS, and displayed on the subscriber's TV screen by the IRD, to inform the subscriber of problems or instruct the subscriber to contact the SMS.

Packet A unit of data transmitted over a packet switching network. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream.

PAL Phase Alternating Line: A color TV broadcasting system where the phase of the R-Y color-difference signal is inverted on every alternate line to average out errors providing consistent color reproduction.

PAT Program Association Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. The PAT points (maps) to the PMT.

PCM Pulse Code Modulation: A process in which a signal is sampled, each sample is quantized independently of other samples, and the resulting succession of quantized values is encoded into a digital signal.

PCR Program Clock Reference: A time stamp in the transport stream from which the Decoder timing is derived.

PDC Program Delivery Control: A Teletext service allowing simple programming (i.e. VideoPlus) of VCR recording times. If the desired program is rescheduled, PDC updates the programming information in the VCR.

Pel Picture Element: Also known as a pixel. The smallest resolvable rectangular area of an image either on a screen or stored in memory. On-screen, pixels are made up of one or more dots of color. Monochrome and grey-scale systems use one dot per pixel. For grey-scale, the pixel is energized with different intensities, creating a range from dark to light (a scale of 0-255 for an eight-bit pixel). Color systems use a red, green and blue dot per pixel, each of which is energized to different intensities, creating a range of colors perceived as the mixture of these dots. If all three dots are dark, the result is black. If all three dots are bright, the result is white.

PES Packetized Elementary Stream: A sequential stream of data bytes that has been converted from original elementary streams of audio and video access units and transported as packets. Each PES packet consists of a header and a payload of variable length and subject to a maximum of 64 Kbytes. A time stamp is provided by the MPEG-2 systems layer to ensure correct synchronization between related elementary streams at the Decoder.

PID Packet Identifier: the header on a packet in an elementary data stream, which identifies that data stream. An MPEG-2 / DVB standard.

PIN Personal Identification Number: A password used to control access to programming and to set purchase limits. Each subscriber household can activate several PINs and may use them to set individual parental rating or spending limits for each family member.

Pixel PIX (picture) Element: The digital representation of the smallest area of a television picture capable of being delineated by the bit-stream. See Pel for more information.

pk-pk peak to peak: Measurement of a signal or waveform from its most negative point to its most positive point.

PLL Phase-Locked Loop. A phase-locked loop is a control system which controls the rotation of an object by comparing its rotational position (phase) with another rotating object as in the case of a sine wave or other repeating signal. This type of control system can synchronize not only the speed, but also the angular position of two waveforms that are not derived from the same source.

PMT Program Map Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. Each service has a PMT, which lists the component parts (elementary streams of video, audio, etc.) for the various services being transmitted.

P-picture/P-frame A picture / frame produced using forward prediction. It contains predictions from either previous I frames or previous P frames. The P frame is used as a reference for future P or B frames.

ppm Parts per million.

PPV Pay Per View: A system of payment for viewing services based on a usage / event basis rather than on on-going subscription. Subscribers must purchase viewing rights for each PPV event that they wish to view. PPV events may be purchased as IPPV or OPPV.

Program PC - A sequence of instructions for a computer.
TV - A concept having a precise definition within ISO 13818-1 (MPEG-2). For a transport stream, the timebase is defined by the PCR. The use of the PCR for timing information creates a virtual channel within the stream.

Programme A linking of one or more events under the control of a broadcaster. For example, football match, news, film show. In the MPEG-2 concept, the collection of elementary streams comprising the programme, have a common start and end time. A series of programmes are referred to as events.

P_RP_B Analogue Color difference signals. Refer to C_RC_B for an explanation.

PROM Programmable Read-Only Memory: A device, which may be written once with data for permanent storage, and then read whenever required. Special types of PROM permit the erasure of all data by Ultraviolet light (EPROM) or by application of an electronic signal (EEPROM).

PS Program Stream: A combination of one or more PESs with a common timebase.

PSI Program Specific Information: Consists of normative data, which is necessary for the de-multiplexing of transport streams and the successful regeneration of programs (see also: SI).

PSIP Program System Information Protocol: The ATSC equivalent of SI for DVB.

PSK Phase Shift Keying: A method of modulating digital signals particularly suited to satellite transmission.

PSR Professional Satellite Receiver: See also*:* IRD.

PSU Power Supply Unit.

QAM Quadrature Amplitude Modulation: A method of modulating digital signals, which uses combined techniques of phase modulation and amplitude modulation. It is particularly suited to cable networks.

QoS Quality of Service. A common term for a set of parameters describing the quality you get from an IP network: Throughput, availability, delay, jitter and packet loss.

QPSK Quadrature Phase Shift Keying: A form of phase shift keying modulation using four states.

QSIF Quarter Screen Image Format.

Quantise A process of converting analogue waveforms to digital information. 8-bit quantization as set out in ITU-R Rec. 601. Uses 256 levels in the range 0 – 255 to determine the analogue waveform value at any given point. The value is then converted to a digital number for processing in the digital domain.

RAM Random Access Memory: A volatile storage device for digital data. Data may be written to, or read from, the device as often as required. When power is removed, the data it contains is lost.

RAS Remote Authorization System: A Ericsson proprietary public-key encryption system used to prevent unauthorized viewing of a TV programme or programmes.

RF Radio Frequency.

RGB Red, Green, Blue: The Chroma information in a video signal.

RIP2 Routing Information Protocol v2. A protocol used between network routers to exchange routing tables and information.

ROM	Read Only Memory: A non-volatile storage device for digital data. Data has been stored permanently in this device. No further information may be stored (written) there and the data it holds cannot be erased. Data may be read as often as required.
RS	Reed-Solomon coding: An error detection and correction, coding system. 16 bytes of Reed-Solomon Forward Error Correction code are appended to the packet before transmission bringing the packet length to 204 bytes. The 16 bytes are used at the receiving end to correct any errors. Up to eight corrupted bytes can be corrected.
RSVP	ReSerVation Protocol. A Quality-of-service oriented protocol used by network elements to reserve capacity in an IP network before a transmission takes place.
RTP	Real-time Transfer Protocol. A protocol designed for transmission of real-time data like video and audio over IP networks. RTP is used for most video over IP transmissions.
RLC	Run Length Coding: Minimization of the length of a bit-stream by replacing repeated characters with an instruction of the form ‘repeat character x y times’.
SCPC	Single Channel Per Carrier.
Spectral Scrambling	A process (in digital transmission) used to combine a digital signal with a pseudo-random sequence, producing a randomized digital signal that conveys the original information in a form optimized for a broadcast channel.
Scrambling	Alteration of the characteristics of a television signal in order to prevent unauthorized reception of the information in clear form.
SDI	Serial Digital Interface.
SDT	Service Description Table: Provides information in the SI stream about the services in the system; for example, the name of the service, the service provider, etc.
SDTI	Serial Data Transport Interface. A mechanism that allows transmission of various types of data over an SDI signal. This may be one or more compressed video signals or other proprietary data types. The advantage of SDTI is that existing SDI transmission infrastructure can be used to transport other types of data.
SELV	Safety Extra Low Voltage (EN 60950).
SFP	Small Form-factor Pluggable module. A standardized mechanism to allow usage of various optical interfaces for Gigabit Ethernet. Several types of SFP modules exist: Single-mode fiber modules for long-distance transmission and multi-mode fiber modules for shorter distances. SFP is also known as "mini-GBIC".
SIP	Session Initiation Protocol. A common acronym for the ongoing effort to standardize signalling over IP networks, i.e. connection set-up and tear-down. SIP makes it possible to "dial" a remote receiver of data and set-up the connection in this way.

STB	Set-Top Box: A box that sits on top of a television set and is the interface between the home television and the cable TV company. New technologies evolving for set-top boxes are video-on-demand, video games, educational services, database searches, and home shopping. The cable equivalent of the IRD.
SFN	Single Frequency Network: The SFN technique allows large geographic areas to be served with a common transmission multiplex. All transmitters in the network are synchronously modulated with the same signal and they all radiate on the same frequency. Due to the multi-path capability of the multi-carrier transmission system (COFDM), signals from several transmitters arriving at a receiving antenna may contribute constructively to the total wanted signal. The SFN technique is not only frequency efficient but also power efficient because fades in the field strength of one transmitter may be filled by another transmitter.
SI	Service Information: Digital information describing the delivery system, content and scheduling (timing) of broadcast data streams. DVB-SI data provides information to enable the IRD to automatically demultiplex and decode the various streams of programmes within the multiplex. Specified in ISO/IEC 13818[1]. (DVB)
Single Packet Burst Mode	A burst of ASI bytes (either 188 or 204, depending on packet length) is contiguously grouped into an MPEG-2 transport stream packet. Stuffing data is added between the packets to increase the data rate to 270 Mbps. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
Smart Card	A plastic card with a built-in microprocessor and memory used for identification, financial transactions or other authorizing data transfer. When inserted into a reader, data is transferred to and from the host machine or a central computer. It is more secure than a magnetic stripe card and it can be disabled if the wrong password is entered too many times. As a financial transaction card, it can be loaded with digital money and used in the same way as cash until the balance reaches zero. The file protocol is specific to its intended application.
SMATV	Satellite Mast Antenna Television: A distribution system, which provides sound and television signals to the households of a building or group of buildings, typically used to refer to an apartment block.
SMPTE	Society of Motion Picture and Television Engineers.
SMS	Subscriber Management System: A system which handles the maintenance, billing, control and general supervision of subscribers to conditional access technology viewing services provided through cable and satellite broadcasting. An SMS can be an automatic (e.g. Syntellect) system where subscribers order entitlements by entering information via a telephone. Alternatively, an SMS can be a manual system, which requires subscribers to speak with an operator who then manually enters their entitlement requests. Some systems support multiple SMSs.
SNG	Satellite News-Gathering.
SNMP	Simple Network Management Protocol.

SNTP	Simple Network Time Protocol is an Internet protocol used to synchronize the clocks of computers to some time reference. It is a simplified version of the protocol NTP protocol which is too complicated for many systems.
Spatial Redundancy	Information repetition due to areas of similar luminance and/or chrominance characteristics within a single frame. Removed using DCT and Quantization (Intra-Frame Coding).
SPI	Synchronous Parallel Interface.
Statistical Redundancy	Data tables are used to assign fewer bits to the most commonly occurring events, thereby reducing the overall bit rate. Removed using Run Length Coding and Variable Length Coding.
TAXI	Transparent Asynchronous Tx / Rx Interface: A proprietary high speed data interface.
TCP / IP	Transmission Control Protocol/Internet Protocol: A set of communications protocols that may be used to connect different types of computers over networks.
TDM	Time Division Multiplex: One common, communications channel carrying a number of signals, each with its own allotted time slot.
TDT	Time and Date Table: Part of the DVB Service Information. The TDT gives information relating to the present time and date.
Temporal Redundancy	Information repetition due to areas of little or no movement between successive frames. Removed using motion estimation and compensation (Inter-Frame Coding).
Time stamp	A term that indicates the time of a specific action such as the arrival of a byte or the presentation of a presentation unit.
TOT	Time Offset Table: This optional SI table supports the use of local offsets as well as the UTC time/date combination. The purpose of the table is to list by country the current offset from UTC and the next expected change to that offset (to track when daylight saving occurs). The offset resolution is to within 1 minute over a range of ±12 hours from UTC.
Transport Stream	A set of packetized elementary data streams and SI streams, which may comprise more than one programme, but with common synchronization and error protection. The data structure is defined in ISO/IEC 13818-1 [1] and is the basis of the ETSI Digital Video Broadcasting standards.
Transport Stream Packet Header	A data structure used to convey information about the transport stream payload.
TS	Transport Stream.
TSDT	Transport Stream Descriptor Table: A component of the MPEG-2 PSI data. This table describes which type of Transport stream it is in (i.e. DVB, ATSC etc.). It may also contain other descriptors.
TSP	Transport Stream Processor.
U	44.45 mm (rack height standard).

UART	Universal Asynchronous Receiver Transmitter: A device providing a serial interface for transmitting and receiving data.
UDP	User Datagram Protocol. A protocol above the IP layer that provides port multiplexing in addition. In essence, you can transmit IP data packets to several receiving processes in the same unit/device.
Unicast	Point-to-point connection, i.e. the "opposite" of multicast which is one to many (or many to many). In this mode, a transmit unit sends video data direct to a unique destination address.
Upconvert	The process by which the frequency of a broadcast transport stream is shifted to a higher frequency range.
Uplink	The part of the communications satellite circuit that extends from the Earth to the satellite.
UPS	Uninterruptable Power Supply: A method of supplying backup power when the electrical power fails or drops to an unacceptable voltage level. Small UPS systems provide battery power for a few minutes; enough to power down the computer in an orderly manner. This is particularly important where write back cache is used. Write back cache is where modified data intended for the disk is temporarily stored in RAM and can be lost in the event of a power failure. Sophisticated systems are tied to electrical generators that can provide power for days. UPS systems typically provide surge suppression and may provide voltage regulation.
UTC	Universal Time Coordinate: An internationally agreed basis for timekeeping introduced in 1972 and based on international atomic time (corresponds to Greenwich Mean Time or GMT).
VITC	Vertical Interval Time Code.
VITS	Vertical Interval Test Signal: See: ITS.
VLAN	Virtual LAN, a network of units that behave as if they are connected to the same wire even though they may actually be physically located on different segments of a LAN.
VPS	Video Programming System: A German precursor to PDC
WSS	Wide Screen Switching: Data used in wide-screen analogue services, which enables a receiver to select the appropriate picture display mode.
WST	World System Teletext: System B Teletext. Used in 625 line / 50 Hz television systems (ITU-R 653).
XILINX	A type of programmable Integrated Circuit.
XLR	Audio connector featuring three leads, two for signal and one for GND.
XML	eXtensible Markup Language. A very common self-describing text-based data format. Used for many purposes: Meta-data, configuration files, documents, etc. The readability of the format has made it very popular and is now the fundament for many types of WEB services.

Y (Luminance)	Defines the brightness of a particular point on a TV line. The only signal required for black and white pictures.
Y/C	Broadcast video with separate color, Y (luminance) and C (Chroma) (sometimes called S-Video).
YUV	Y: Luminance component (Brightness), U and V: Chrominance (Color difference)

Technical Specification

Annex B

Contents

B.1	Unit Specification	B-3
B.2	Rear Panel Connectors	B-4
B.2.1	Ethernet Data	B-4
B.2.2	SFP Mini-GBIC Module Data	B-4
B.2.3	RF Output	B-5
B.2.4	Modulator Characteristics	B-7
B.2.5	Ethernet Control	B-7
B.2.5.1	Connector Specification	B-7
B.2.5.2	User Control Interfaces	B-8
B.2.5.3	Control Parameters	B-8
B.3	Power Supply	B-10
B.3.1	AC Power Supply Specification	B-10
B.3.2	AC Fuse Information	B-10
B.3.3	DC Supply Input (-48 V DC Version)	B-11
B.4	Physical Details	B-11
B.5	Environmental Conditions	B-12
B.6	Compliance	B-12
B.6.1	Safety	B-12
B.6.2	EMC	B-12
B.6.3	Telecommunications	B-13
B.6.4	CE Marking	B-13
B.6.5	C-Tick Mark	B-13
B.6.6	Packaging Statement	B-14
B.6.7	Packaging Markings	B-14
B.6.8	Materials Declarations	B-15
B.6.8.1	For the European Union	B-15
B.6.8.2	For China	B-15
B.6.9	Equipment Disposal	B-16
B.6.9.1	General	B-16
B.6.9.2	For the European Union	B-16
B.6.10	Recycling	B-16
B.7	Cable Types	B-17

List of Tables

Table B.1 EQ8096 Unit Specification B-3
Table B.2 Ethernet Data Connector B-4
Table B.3 SFP GBIC Data Connector B-4
Table B.4 RF Output Connector B-5
Table B.5 RF Performance Specification B-5
Table B.6 Modulator Characteristics B-7
Table B.7 Ethernet Control Connector B-7
Table B.8 Control Parameters B-8
Table B.9 AC Power Supply Specification B-10
Table B.10 AC Fuse Type and Rating B-10
Table B.11 DC Power Supply Specification B-11
Table B.12 Physical Details B-11
Table B.13 Environmental Specification B-12
Table B.14 Suitable Signal Cable Types B-17

B.1 Unit Specification

The EQ8096 Unit specification is shown in *Table B.1.* This may be subject to change with further development.

Table B.1 EQ8096 Unit Specification

	Item	**Specification**
Inputs	Gigabyte Ethernet Interface	4 x Redundant pair RJ-45 or optional 4 x Redundant pair SFP (Small Form-Factor Pluggable).
	Capability	Process up to 4 fully loaded Gigabit Ethernet link simultaneously.
		Up to 4096 CBR or VBR single program Transport Streams
		Support for a single multi-program Transport Stream per QAM
		Support for Service dropping and PID filtering/remapping
		Support for multiplexing up to 4 SPTSs into an MPTS
		Stream encapsulation in UDP (RFC 768) or RTP (RFC 3550)
		Up to seven Transport Stream packets per IP datagram
		Removes up to ±60 ms input jitter
		Supports DOCSIS 3.0 DEPI MPT and PSP modes of data encapsulation
		Supports DTI Timestamp insertion and restamping
		Support for unicast and multicast flows
		PSIG support
Outputs	RF Performance	Refer to *Table B.5*
	Modulation Characteristics	Refer to *Table B.6*
Processing		Dejittering of each incoming Transport Stream
		Extraction of incoming PSI
		PID remapping
		Automatic generation and insertion of outgoing PSI tables
		MPEG-2 multiplexing of up to 96 multiple program Transport Streams in accordance with ISO/IEC 13818-1

	Item	Specification
		Insertion of SI/Data streams into any output Transport Stream.
		Internal Packet Replication offering ‘Any to Many’ architecture.
Control		Dedicated 10/100 Ethernet control port (RJ-45) redundant pair
		Dedicated 10/100 Ethernet Conditional Access port (RJ-45) redundant pair
		SNMPv1,2 and HTTP control
		RS-232 port for basic configuration
		Complete configuration possible with a single file download to ease large deployments

B.2 Rear Panel Connectors

B.2.1 Ethernet Data

The Ethernet Data connector specification is shown in *Table B.2*.

Table B.2 Ethernet Data Connector

Item	Specification
Safety status	SELV
Connector designation	1000BaseT
Connector type	8-way, RJ-45 socket 2 x 4 port.
Signal type	1000BaseT Ethernet
Data rate	Line rate

B.2.2 SFP Mini-GBIC Module Data

The Small Form-factor Pluggable (SFP) Gigabit Interface Converter (GBIC) Data connector (when option fitted) specification is shown in *Table B.3*.

Table B.3 SFP GBIC Data Connector

Item	Specification
Safety status	SELV
Connector designation	SFP GBIC 1 / SFP GBIC 2

Item	Specification
Connector type	Small Formfactor Pluggable (SFP) transceiver socket (INF-8074I – Rev 1.0) 2 x 4 port
Module types supported	Fiber and electrical

This connector takes the form of a cage, with electrical connections, into which up to 8 pluggable adapters can be inserted. The adapter configures the interface to accept specific fiber optic used in a system.

B.2.3 RF Output

The RF outputs have the physical specification shown in *Table B.4.*

Table B.4 RF Output Connector

Item	Specification
Safety status	SELV
Connector type	F-type female, single-D
Connector designation	RF n
Output impedance	75 Ω

The RF Output connectors conform to the RF performance requirements defined in *Table B.5*.

Table B.5 RF Performance Specification

Parameter	Requirement
Number of RF channels per RF output socket	**6 MHz**: 1, 2, 3, 4 switchable **8 MHz**: 1, 2, 3, 4 switchable
Modulation type	64QAM, 256QAM
Symbol rate	Annex A: User definable Annex B 64QAM: 5.056941 Msym/s Annex B 256QAM: 5.360537 Msym/s
BER	< 10e-10
I/Q amplitude imbalance	< 0.1 dB (i.e. <1%)
I/Q phase imbalance	< 0.1 deg
Centre frequency range for any RF channel	57-867 MHz (57-999 MHz available when 1GHz licensed on unit)
Centre frequency step size	1 kHz (10kHz from GUI)
Centre frequency accuracy	< ±500 Hz over 0 to 50°C for up to 10 years

Parameter	Requirement
Maximum RF Output power per channel	N=1: 60 dBmV N=2: 56 dBmV (i.e. 59 dBmV total power) N=3: 54 dBmV (i.e. 58.8 dBmV total power) N=4: 52 dBmV (i.e. 58 dBmV total power)
RF Output power adjustment	8 dB range. All channels have the same output power
Level adjustment steps	0.1 dB (monotonic)
Absolute RF Output power accuracy per channel	±2 dB
RF Output level drift over temperature and time relative to median at that channel	±1.0dB
Phase noise	1–10 kHz: <-33 dBc DSB 10–50 kHz: <-51 dBc DSB 50–3000 kHz: <-51 dBc DSB
Output Return loss	>14 dB 50-870 MHz >10 dB 35-50 MHz and 870-1002 MHz
Adjacent channel (750 kHz from channel block edge to Bsys MHz from channel block edge)	**6 MHz** N=1/2/3/4: <-62/-60/-60/-60 dBc **8 MHz** N=1/2/3: <-60.5/-59/-58.5 dBc
Next-adjacent channel (Bsys MHz from channel block edge to 2Bsys MHz from channel block edge)	**6 MHz** N=1/2/3/4: <-65/-64/-63.5/-63 dBc **8 MHz** N=1/2/3: <-63.5/-63/-62.5 dBc
Third-adjacent channel (2Bsys MHz from channel block edge to 3Bsys MHz from channel block edge)	**6 MHz** N=1/2/3/4: <-73/-70/-67/-65 dBc **8 MHz** N=1/2/3: <-71.5/-68.5/-65.5 dBc
Noise in other channels (47 MHz to 1000 MHz) Measured in each Bsys MHz channel excluding: a) Desired channel(s). b) 1st, 2nd, and 3rd adjacent channels. c) Channels coinciding with 2nd and 3rd harmonics	**6 MHz** N=1/2/3/4: <-73/-70/-68/-67 dBc **8 MHz** N=1/2/3: <-71.5/-68.5/-66.5 dBc
In each of 2N contiguous Bsys MHz channels or in each of 3N contiguous Bsys MHz channels coinciding with 2nd harmonic and with 3rd harmonic components respectively (up to 1000 MHz)	<-63 dBc

Where fc = carrier frequency, fw = individual channel bandwidth.

There is no support for individually setting the output power of each individual channel in a group. There is no support for individually setting the modulation parameters of each channel.

B.2.4 Modulator Characteristics

The EQ8096 modulator assembly conforms to the specification defined in *Table B.6.*

Table B.6 Modulator Characteristics

Parameter	Specification
Number of QAM modulators per output	4
Specification	ITU-T J.83 Annex A/B/C
Modulation type	64, 256 QAM DOCSIS 3.0
Square-root Nyquist filtering	32-tap filter, stop band attenuation min. 60 dB
DAC (digital-to-analogue converter)	14 bit D/A
FEC	According to ITU-T J.83 annex A/B/C
Symbol rate	DOCSIS 3.0
Modulation data rate	max. 57.6 Mbps (incl. FEC)
MER	DOCSIS 3.0
BER	$< 10e^{-10}$
I/Q amplitude imbalance	< 0.1 dB
I/Q phase imbalance	< 0.1 deg
Channel bandwidth	6 or 8 MHz

B.2.5 Ethernet Control

B.2.5.1 Connector Specification

The Ethernet Data connector specification is shown in *Table B.7*.

Table B.7 Ethernet Control Connector

Item	Specification
Safety status	SELV
Connector designation	10/100/1000 Control
Connector type	8-way, RJ-45 socket
Signal type	10/100BaseT Control
Data type	Control only

B.2.5.2 User Control Interfaces

The EQ8096 support control of user configurable parameters and the reporting of status and alarms via SNMP, Telnet, RS-232 and HTTP.

Caution!

Only qualified Ericsson Field Service personnel shall use the telnet interface. This exclusion does not exclude the use of the interface for setting the initial control port IP address.

Only one Telnet connection to the card is permitted at any time. Simultaneous control and monitoring from the Telnet, SNMP and HTTP interfaces is supported. Where appropriate, user control parameter changes and status parameter changes are reflected simultaneously on all control interfaces.

B.2.5.3 Control Parameters

All user control parameters are stored in non-volatile memory to allow restoration from power up with no user intervention. *Table B.8* provides a list of all user control parameters that are directly related to the MPEG over IP application.

Table B.8 Control Parameters

Parameter	Range		Default value
Data port Physical interface	1000BaseTX: GBIC		1000BaseTX
Time server IP address	XXX:XXX:XXX:XXX		0.0.0.0
Time server control	ENABLED: DISABLED		DISABLED
Time: Entered as a compete set of parameters. Time shall auto increment once entered, or be overwritten if a time-server is enabled and connected.	Hours	0..23	0
	Minutes	0..59	0
	Date	1..31	1
	Month	1..12	1
	Year	1900…	2008
MAC layer CRC control	ENABLED: DISABLED		DISABLED
Transport Stream ID for each generated PAT 96 entries	0..65535		1..96

Parameter	Range			Default value		
Modulation configuration. Parameters to be used to configure all Modulated outputs.						
Mode	Annex A	Annex B	Annex C	Annex A		
	Annex A	Annex B	Annex C	Annex A	Annex B	Annex C
Constellation	64QAM 256QAM	64QAM 256QAM	64QAM 256QAM	64QAM	64QAM	64QAM
Symbol Rate (MSym/s) with resolution of 1 symbol/sec	Fixed	Fixed	Fixed	6.952	64QAM: 5.056941 256QAM: 5.360537	64QAM: 5.350 256QAM: 5.350
Interleaving Depth (I,J)	(12,17) (Fixed)	(128,1) (64,2) (32,4) (16,8) (8,16) (128,2) (128,3) (128,4) (128,5) (128,6) (128,7) (128,8)	(12,17) (Fixed)	(12,17)	(64,2)	(12,17)
RF Output Configuration. An entry for each RF connector (3)	Centre RF output frequency for carrier 1 (MHz) with resolution of 10 kHz	57-855 (996 when 1GHz license enabled)		57		
	RF output level (dBmv) with resolution of 0.1 dBmV	44..58		44		
	Channel number	1..4		1..4		
	Channel mode (RF output status)	ON OFF Test Dual Tone		OFF		
	ENABLED, DISABLED	ENABLED				
Software watchdog reset	ENABLED, DISABLED			DISABLED		
Activate Unit reset						

B.3 Power Supply

B.3.1 AC Power Supply Specification

This equipment can be fitted with two power supplies allowing for 1 + 1 redundancy. It is suitable for supply voltages of 100-240 V AC –10% +6% at 50/60 Hz nominal.

Table B.9 AC Power Supply Specification

Item	Specification
Power distribution system	Type TN ONLY (EN 60950-1 Annex V): Power distribution system which is directly earthed, the parts of the equipment required to be earth being connected by Protective Earthing Conductors. This equipment must NOT be used with single-phase three-wire and PE, TT or IT Type Power distribution systems.
Connection to supply	Pluggable Equipment Type A (EN 60950-1 para 1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance Coupler or both. Correct mains polarity must always be observed. Do not use reversible plugs with this equipment.
Class of equipment	Class I Equipment (EN 60950-1 para 1.2.4): electric shock protection by basic insulation and protective earth.
Rated voltage	100-240 V AC (single phase)
Rated frequency	50/60 Hz
Voltage selection	Wide-ranging
Rated current	4.5 A – 2.5 A (100-240 V AC range)
Input connector	CEE 22/IEC 3-pin male receptacle
PSU power consumption	410 W maximum (Single PSU)

B.3.2 AC Fuse Information

Table B.10 AC Fuse Type and Rating

Power Supply	Fuse Type and Rating
AC fuse	Fuse in live conductor in mains input filter Do not use reversible plugs with this equipment.
AC fuse type	5 A, 250 V, 5x20 mm time delay (T) 1500 A breaking capacity (HBC) IEC/EN 60127-2 Sheet 5 e.g. Bussmann S505 or Littelfuse 215

B.3.3 DC Supply Input (-48 V DC Version)

Notes: Only models M2/---/-----/48V and M2/---/-----/48V use a DC power supply.

Ensure correct polarity is maintained.

The unit must have a protective earth.

Table B.11 DC Power Supply Specification

Item	Specification
Rated voltage:	For connection to –48 V DC supplies only. (PSU input tolerance –42 to –60 V DC). Correct polarity must always be observed.
Rated current:	9 A
Input connector:	The following parts from AMP or Molex may be used (see *Figure 2.4*): AMP Universal MATE-N-LOK Housing: AMP no. 1-480700-0 Female terminal (3 needed per housing): AMP no. 926901-1 Molex MLX Housing: Molex no. 50-84-1030 Female terminal (3 needed per housing): Molex no. 02-08-1002
DC fuse type and rating:	Fuse in –48 V DC connector (see *Figure 2.3*) at rear of unit. Bussmann S505 Littelfuse 215 5x20 mm time delay (T) 1500A breaking capacity (HBC) IEC/EN 60127-2 Sheet 5 10 A 250 V T HBC
Power consumption	410 W maximum

B.4 Physical Details

Table B.12 Physical Details

Item	Specification
Height	89 mm chassis (2RU)
Width	483 mm including fixing brackets
Overall width	482.6 mm including fixing brackets
Depth	543 mm excluding rear connector clearance
Maximum weight	15 kg (33 lbs)

B.5 Environmental Conditions

Table B.13 Environmental Specification

Item	Specification
Operational	
Temperature:	0°C to +50°C ambient with free air-flow
Relative humidity:	0% to 90% (non-condensing)
Handling/movement:	Designed for fixed use when in operation
Storage/Transportation	
Temperature:	–20°C to +70°C (–4°F to 158°F)
Relative humidity:	0% to 90% (non-condensing)

B.6 Compliance[1]

B.6.1 Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950-1	European	Information technology equipment - Safety.
IEC 60950-1	International	Information technology equipment - Safety.
UL 60950-1	USA	Information Technology Equipment - Safety.

B.6.2 EMC[2]

The equipment has been designed and tested to meet the following:

EN 55022 and CISPR22	European International	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2[3]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).

[1] The version of the standards shown is that applicable at the time of manufacture.
[2] The EMC tests were performed with the Technical Earth attached, and configured using recommended cables (see *Table B.14*).

EN 61000-3-3[3]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.
EN 55024	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47-Telecommunications, Part 15: Radio frequency devices, subpart B - Unintentional Radiators.

B.6.3 Telecommunications

If certain Option Modules (telecom interfaces) are fitted, this equipment comes within the scope of the RTTE Directive, 1999/5/EC. Compliance with the applicable essential requirements of this Directive (safety and EMC) are met by conformance with the safety and EMC standards listed above.

B.6.4 CE Marking

CE

The CE mark is affixed to indicate compliance with the following directives:

DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility

1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity. (If fitted with telecom type interface modules).

Note: The CE mark was first affixed to this product in 2007.

B.6.5 C-Tick Mark

N10196

The C-Tick mark is affixed to denote compliance with the Australian Radiocommunications (Compliance and Labelling – Incidental Emissions) Notice made under s.182 of Radiocommunications Act 1992.

[3] Applies only to models of the Product using ac power sources.

Note: The C-Tick mark was first affixed to this product in 2007.

B.6.6 Packaging Statement

The Stratocell ® or Ethafoam 220 ® polyethylene foam inserts can be easily recycled with other low density polyethylene (LDPE) materials.

B.6.7 Packaging Markings

The symbols printed on the outer carton are described below:

Handle with care.

This way up.

Fragile.

Protect from moisture.

See *Section B.6.4* for compliance with directives details.

See *Section B.6.5* for compliance details.

Defines country of origin.

The packaging is reusable per GB 18455-2001.

This symbol guarantees that packaging with this symbol is recyclable and will be accepted by cardboard recyclers.

Recyclable per GB 18455-2001.

B.6.8 Materials Declarations

Ericsson's products are designed and manufactured in keeping with good environmental practice. Our component and materials selection policy prohibits the use of a range of potentially hazardous materials. In addition, we comply with relevant environmental legislation.

B.6.8.1 For the European Union

For products sold into the EU after 1st July 2006, we comply with the EU RoHS Directive. We also comply with the WEEE Directive.

B.6.8.2 For China

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared together with a statement of the "Environmentally Friendly Use Period (EFUP)": the time the product can be used in normal service life without leaking the hazardous materials. Ericsson expects the normal use environment to be in an equipment room at controlled temperatures (around 22°C) with moderate humidity (around 60%) and clean air, near sea level, not subject to vibration or shock.

Where an Ericsson product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. For Ericsson products, the hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of "General Rule of Environment-Friendly Use Period of Electronic Information Products". This is indicated by the product marking:

It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

B.6.9 Equipment Disposal

B.6.9.1 General

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Regulations, policies and/or environmental restrictions differ throughout the world. Contact your local jurisdiction or local authority for specific advice on disposal.

B.6.9.2 For the European Union

"This product is subject to the EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) and should not be disposed of as unsorted municipal waste."

B.6.10 Recycling

Ericsson SA TV Recycling has a process facility that enables customers to return Old and End-of-Life Products for recycling if it is required.

Ericsson provides assistance to customers and recyclers through our Ericsson and SATV Recycling eBusiness Portal.

This can be reached at: https://ebusiness.ericsson.net/.

To gain access to the Recycling site, you must be set up with a unique login and password.

To request the login, please contact tvtechpubs@ericsson.com, and include the information below:

- First/Last name
- Password request (6 numbers/characters). If you do not include this information one will be created for you.
- Phone
- Location (Country)
- Company
- Work Area (select one of the below)
  - Executive Management
  - Marketing and Sales

- Planning/Engineering
- Procurement/Supply
- Project & Programme
- Implementation
- Operations and Maintenance
- R&D
- Other

B.7 Cable Types

The signal cable types (or similar) in *Table B.14* are those recommended by Ericsson in order to maintain product EMC compliance.

Table B.14 Suitable Signal Cable Types

Signal Type	**Connector**	**Cable**
Ethernet	RJ-45	Belden Data Twist (S-FTP) Gigabit
RF Out	F-type	CT100 RF cable/Belden 1694A
Host Status	9-way D-type male	Belden 8162 CM2PR24 shielded
Data SFP GBIC	Fibre	Fiber

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